Dell™ OptiPlex™ 360
Service Manual

Models DCSM and DCNE

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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Models DCSM and DCNE

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Contents

1 Before Working on Your Computer 9

Recommended Tools **9**

Before Working on Your Computer **9**

Turning Off Your Computer 10

Inside View of Your Computer **11**

Mini Tower Computer 11

Desktop Computer 12

System Board Components **13**

Mini Tower Computer System Board Components . 13

Desktop Computer System Board Components . . 15

After Working on Your Computer **17**

2 Computer Cover 19

Mini Tower Computer Cover **19**

Removing the Mini Tower Computer Cover 19

Replacing the Mini Tower Computer Cover 21

Desktop Computer Cover **21**

Removing the Desktop Computer Cover 21

Replacing the Desktop Computer Cover 23

3 Drive Bezel 25

Removing the Drive Bezel **25**

Replacing the Drive Bezel **26**

Removing a Drive Bezel Insert **27**

Replacing a Drive Bezel Insert **28**

4 Cards 29

PCI and PCI Express Cards **29**

Removing a PCI or PCI Express Card From a Mini Tower Computer 30

Installing or Replacing a PCI or PCI Express Card in a Mini Tower Computer 31

Removing a PCI or PCI Express Card From a Desktop Computer 35

Installing or Replacing a PCI or PCI Express Card in a Desktop Computer 36

PS/2 Serial-Port Adapter **41**

Removing a PS/2 Serial-Port Adapter From a Mini Tower Computer 41

Installing or Replacing a PS/2 Serial-Port Adapter in a Mini Tower Computer 42

Removing a PS/2 Serial-Port Adapter From a Desktop Computer 46

Installing or Replacing a PS/2 Serial-Port Adapter in a Desktop Computer 47

Removing a Card From the Optional Riser-Card Cage . . **50**

Installing or Replacing a Card in the Optional Riser-Card Cage 52

5 Drives 55

About the Drives **55**

Recommended Drive Cable Connections 55

Connecting Drive Cables 55

Drive Interface Connectors. 56

Connecting and Disconnecting Drive Cables . . . 56

Optical Drive **57**

Removing an Optical Drive From the Mini Tower Computer 57

Replacing or Adding an Optical Drive in the Mini Tower Computer 58

Removing an Optical Drive Panel Insert 59

Installing an Optical Drive Panel Insert 59

Removing the Optical Drive From the Desktop Computer 59

Replacing the Optical Drive in the Desktop Computer 60

Floppy Drive or Media Card Reader **62**

Removing a Floppy Drive or Media Card Reader From the Mini Tower Computer 62

Replacing or Adding a Floppy Drive or Media Card Reader in the Mini Tower Computer. 64

Removing a Floppy Drive or Media Card Reader From the Desktop Computer 66

Replacing or Adding a Floppy Drive or Media Card Reader in the Desktop Computer 68

Hard Drives. **70**

Removing a Hard Drive From the Mini Tower Computer 70

Replacing or Adding a Hard Drive in a Mini Tower Computer 72

Removing a Hard Drive From a Desktop Computer 76

Replacing or Adding a Hard Drive in a Desktop Computer 77

6 I/O Panel 81

Removing the I/O Panel **81**

Replacing the I/O Panel **83**

7 Processor Heat-Sink Assembly 85

Removing the Processor Heat-Sink Assembly **85**

Replacing the Processor Heat-Sink Assembly **87**

8 Memory Modules 89

Removing a Memory Module **89**

Replacing or Adding a Memory Module **90**

9 Coin-Cell Battery 93

Removing the Coin-Cell Battery **93**

Replacing the Coin-Cell Battery **94**

10 Speakers 95

Removing a Speaker **95**

Replacing a Speaker **97**

11 Processor 99

Removing the Processor **99**

Replacing the Processor **100**

12 Power Supply 103

Mini Tower Computer Power Supply **103**

Removing the Power Supply From the Mini Tower Computer 103

Replacing the Power Supply in the Mini Tower Computer 104

Power Connectors in the Mini Tower Computer . . 106

Desktop Computer Power Supply **110**

Removing the Power Supply From the Desktop Computer 110

Replacing the Power Supply in the Desktop Computer 111

Power Connectors in the Desktop Computer . . . 112

13 BIOS 117

Flashing the BIOS From a CD **117**

Flashing the BIOS From the Hard Drive **118**

14 System Board 119

Removing the System Board **119**

Replacing the System Board **120**

15 Troubleshooting 123

Tools **123**

Power Lights 123

Beep Codes 124

Diagnostic Lights 126

Diagnostic Light Codes During POST 127

System Messages. 134
Hardware Troubleshooter 135

Dell Diagnostics **136**
When to Use the Dell Diagnostics 136
Starting the Dell Diagnostics From Your Hard Drive 136
Starting the Dell Diagnostics From the Drivers and Utilities Disc 137
Dell Diagnostics Main Menu 139

Solving Problems **141**
Battery Problems 141
Drive Problems 142
Error Messages 144
IEEE 1394 Device Problems 145
Keyboard Problems 145
Lockups and Software Problems 146
Memory Problems 148
Mouse Problems 148
Network Problems 149
Power Problems 150
Printer Problems 151
Scanner Problems 152
Sound and Speaker Problems 153
Video and Monitor Problems 154

Dell Technical Update Service **156**

Dell Support Utility **156**
Accessing the Dell Support Utility 156
Clicking the Dell Support Icon 156
Double-Clicking the Dell Support Icon 157

16 Contacting Dell 159

1

Before Working on Your Computer

This document provides procedures for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that:

- You have performed the steps in "Before Working on Your Computer" on page 9.
- You have read the safety information that shipped with your computer.
- When replacing a component, you have already removed the original, if installed.

NOTE: The color of your system and certain system components may appear differently than shown in this document.

Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Small plastic scribe
- Flash BIOS update (see the Dell Support website at **support.dell.com**)

Before Working on Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help to ensure your own personal safety.

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: Only a certified service technician should perform repairs on your computer. Damage due to servicing that is not authorized by Dell is not covered by your warranty.

CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

CAUTION: To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1. Ensure that the work surface is flat and clean to prevent the computer cover from being scratched.
2. Turn off your computer (see "Turning Off Your Computer" on page 10).

CAUTION: To disconnect a network cable, first unplug the cable from your computer and then unplug the cable from the network device.

3. Disconnect all telephone or network cables from the computer.
4. Disconnect your computer and all attached devices from their electrical outlets.
5. Press and hold the power button while the system is unplugged to ground the system board.

CAUTION: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity, which could harm internal components.

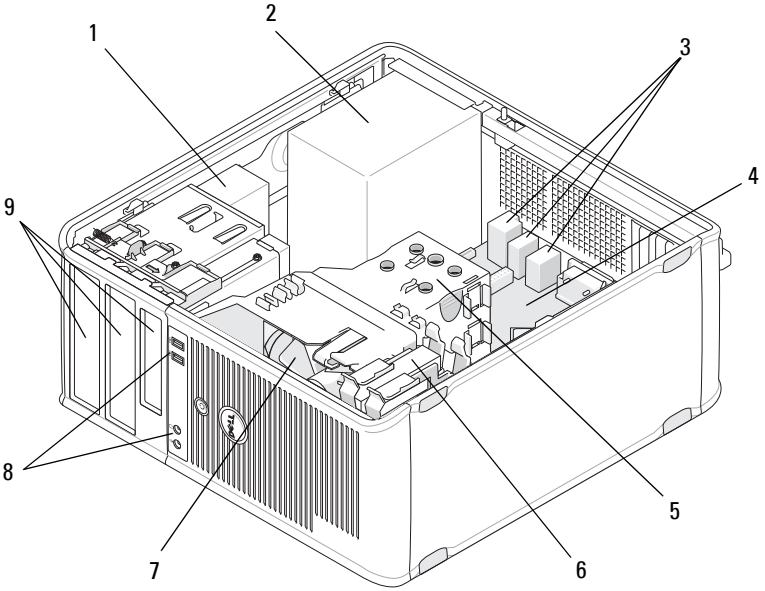
Turning Off Your Computer

CAUTION: To avoid losing data, save and close all open files and exit all open programs before you turn off your computer.

1. Shut down the operating system.
2. Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 4 seconds to turn them off.

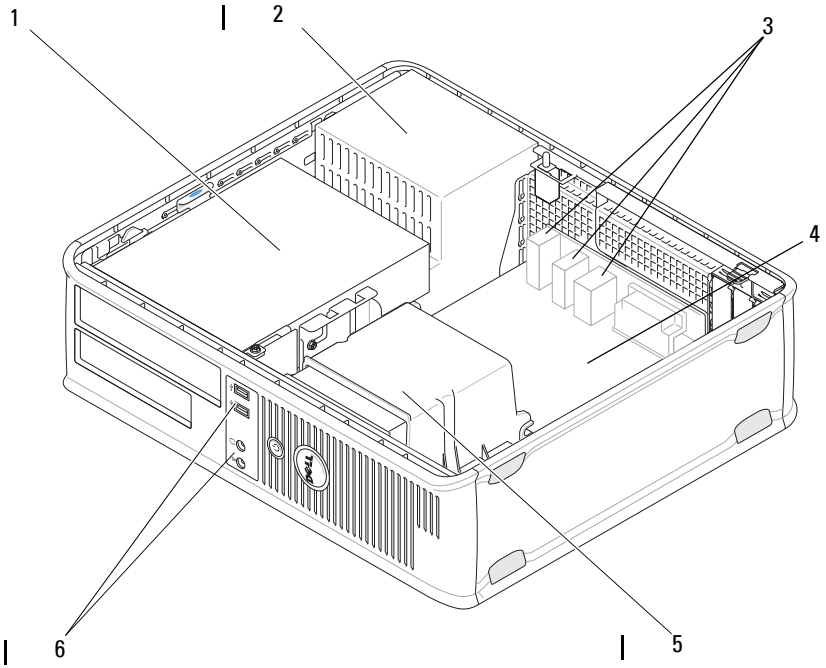
Inside View of Your Computer

Mini Tower Computer



1	optical drive	2	power supply
3	back USB and audio connectors	4	system board
5	heat sink assembly	6	hard drive
7	fan	8	front USB and audio connectors
9	drive bays		

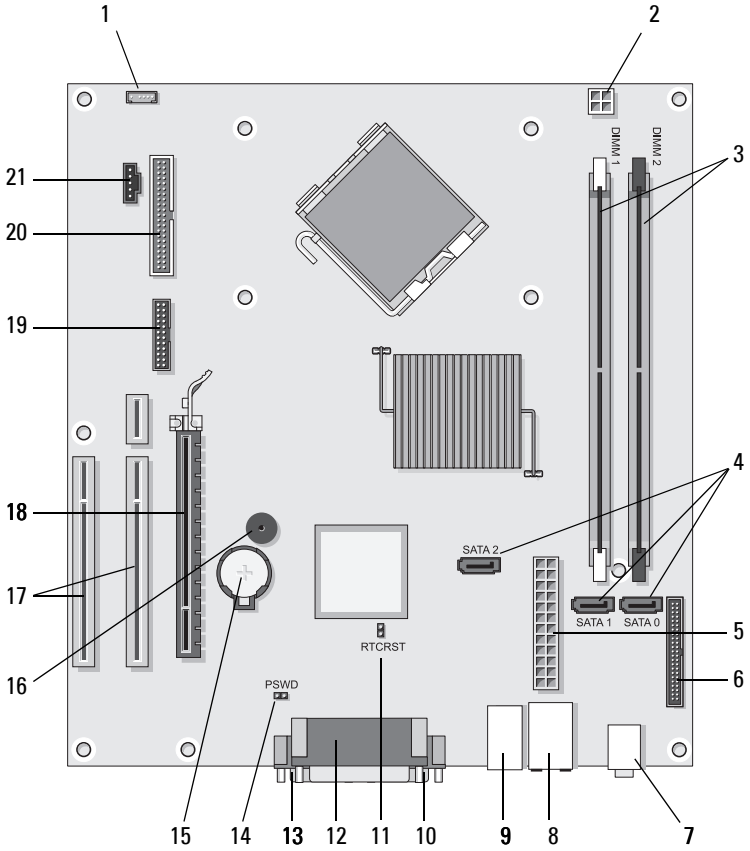
Desktop Computer



1	drive bays (media card reader or floppy drive, optical drive and hard drive)	2	power supply
3	back USB and audio connectors	4	system board
5	heat sink assembly	6	front USB and audio connectors

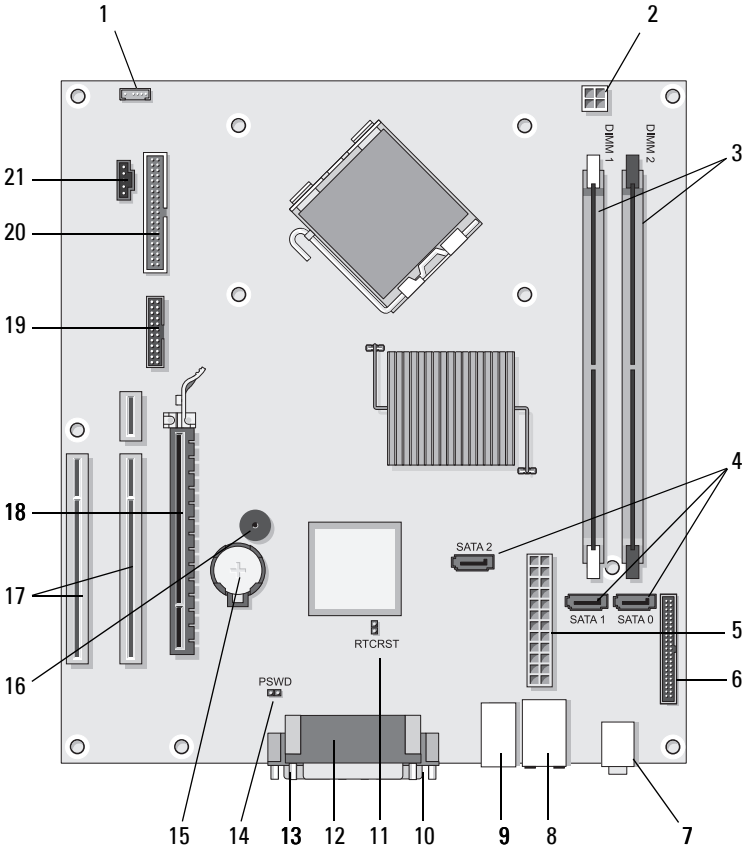
System Board Components

Mini Tower Computer System Board Components



1	internal chassis speaker connector (optional)	2	power connector	3	memory module connectors (DIMM1, DIMM2)
4	serial ATA drive connectors (SATA0, SATA1, SATA2)	5	main power connector	6	floppy drive connector
7	audio connectors (2)	8	network adapter connector, USB ports (2)	9	USB ports (4)
10	VGA video connector	11	RTC reset jumper (RTCRS)	12	parallel (printer) connector
13	serial connector	14	password jumper (PSWD)	15	battery socket
16	system board speaker (BEEP)	17	PCI x1 connectors (SLOT2, SLOT 3)	18	PCI Express x16 connector (SLOT1)
19	PS/2 serial connector	20	floppy drive connector (DSKT)	21	processor fan connector

Desktop Computer System Board Components



1	internal chassis speaker connector (optional)	2	power connector	3	memory module connectors (DIMM1, DIMM2)
4	serial ATA drive connectors (SATA0, SATA1, SATA2)	5	main power connector	6	floppy drive connector
7	audio connectors (2)	8	network adapter connector, USB ports (2)	9	USB ports (4)
10	VGA video connector	11	RTC reset jumper (RTCRS)	12	parallel (printer) connector
13	serial connector	14	password jumper (PSWD)	15	battery socket
16	system board speaker (BEEP)	17	PCI Express x1 connectors (SLOT2, SLOT 3)	18	PCI Express x16 connector (SLOT1)
19	serial connector	20	floppy drive connector (DSKT)	21	processor fan connector

After Working on Your Computer

After you have completed any replacement procedures, ensure you connect any external devices, cards, cables, and so on before turning on your computer.

1. Replace the computer cover (see "Replacing the Mini Tower Computer Cover" on page 21).
2. Connect any telephone or network cables to your computer.

CAUTION: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

3. Connect your computer and all attached devices to their electrical outlets.
4. Turn on your computer.

2

Computer Cover

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

WARNING: Do not operate your equipment with any cover(s) (including computer covers, bezels, filler brackets, front-panel inserts, and so on) removed.

Mini Tower Computer Cover

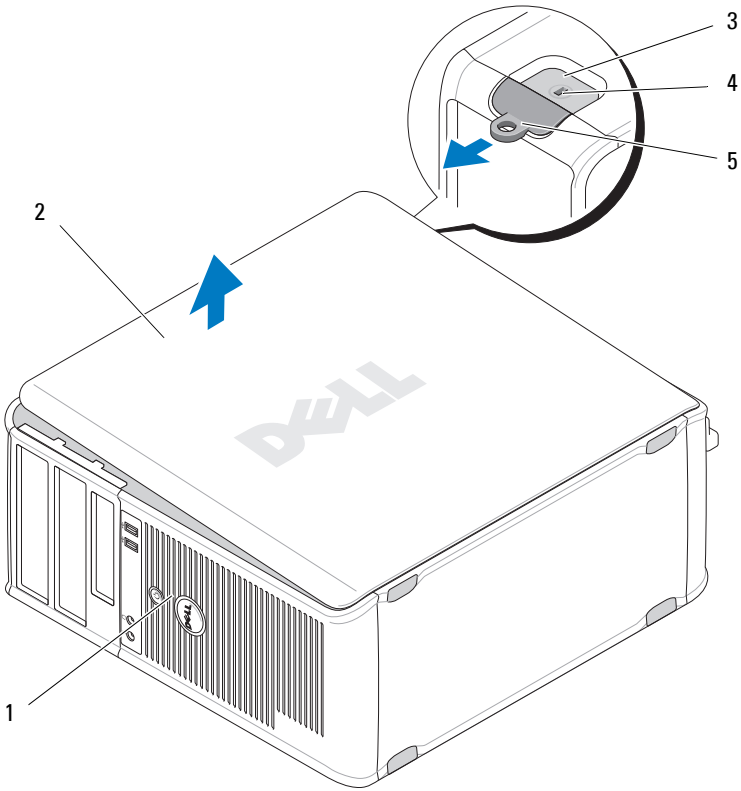
Removing the Mini Tower Computer Cover

1 Follow the procedure in "Before Working on Your Computer" on page 9.

NOTE: Ensure that sufficient space exists to support the removed cover.

CAUTION: Ensure that you are working on a level, protected surface to avoid scratching either the computer or the surface on which it is resting.

2 Set your computer on its right side with the computer cover facing up.



1	front of computer (bezel)	2	computer cover
3	security cable slot	4	cover release latch
5	padlock ring		

3. Release the computer cover by sliding the cover release latch outward. The edge of the cover closest to the latch pops up.
4. Lift the cover away from the computer.
5. Set the cover aside in a secure location.

Replacing the Mini Tower Computer Cover

NOTE: This procedure assumes that you have completed the removal procedure first.

1. Ensure that all cables are connected, and fold cables out of the way.
2. Ensure that no tools or extra parts are left inside the computer.
3. Insert the two clamps on the edge of the chassis into the clamp slots on the cover.
4. Press the computer cover down until you feel a click.
5. Ensure that the cover is seated correctly.
6. Set the computer upright.

CAUTION: Ensure that none of the air vents of the computer are blocked.

7. Follow the procedure in "After Working on Your Computer" on page 17.

Desktop Computer Cover

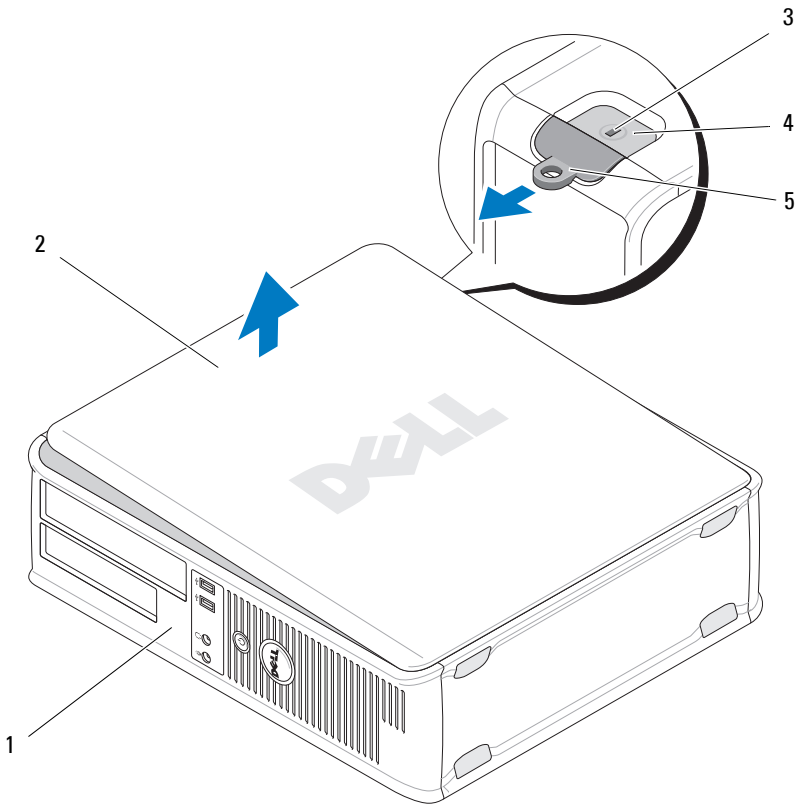
Removing the Desktop Computer Cover

1. Follow the procedure in "Before Working on Your Computer" on page 9.

NOTE: Ensure that sufficient space exists to support the removed cover.

CAUTION: Ensure that you are working on a level, protected surface to avoid scratching either the computer or the surface on which it is resting.

2. Set your computer on its right side with the computer cover facing up.



1	front of computer (bezel)	2	computer cover
3	security cable slot	4	cover release latch
5	padlock ring		

3. Release the computer cover by sliding the cover release latch outward. The edge of the cover closest to the latch pops up.
4. Lift the cover away from the computer.
5. Set the cover aside in a secure location.

Replacing the Desktop Computer Cover

NOTE: This procedure assumes that you have completed the removal procedure first.

1. Ensure that all cables are connected, and fold cables out of the way.
2. Ensure that no tools or extra parts are left inside the computer.
3. Insert the two clamps on the edge of the chassis into the clamp slots on the cover.
4. Press the computer cover down until you feel a click.
5. Ensure that the cover is seated correctly.

CAUTION: Ensure that none of the air vents of the computer are blocked.

6. Follow the procedure in "After Working on Your Computer" on page 17.

3

Drive Bezel

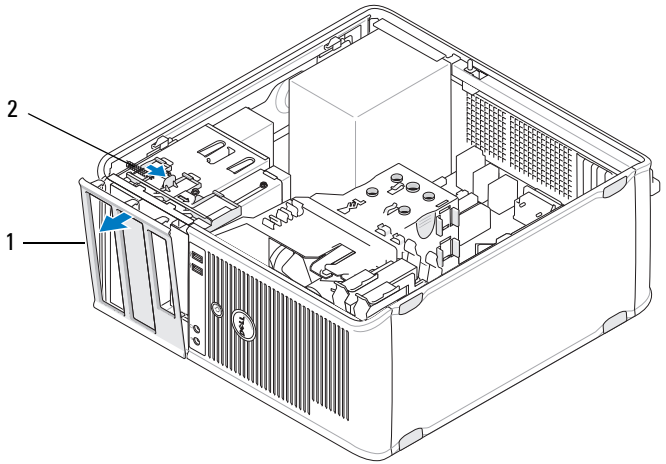
WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTE: This procedure applies only to the mini tower computer. The desktop computer does not have a removable bezel.

Removing the Drive Bezel

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).
3. Locate the blue latch inside the chassis beside the drive bezel along the right edge of the computer. Slide the latch downward and hold it in place.
4. Gently disengage the bezel from the right side, and then release the latch.

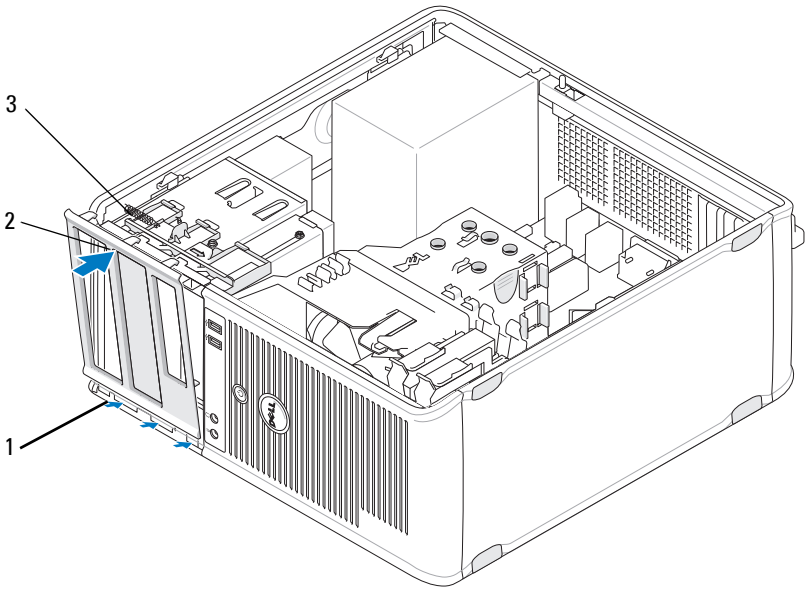


1 bezel 2 bezel latch

Replacing the Drive Bezel

NOTE: This procedure assumes that you have completed the removal procedure first.

1. With the computer set upright, align and insert the clamps on the left edge of the bezel into the bezel clamp slots along the left edge of the front panel.
2. Slide the latch downward and hold it in place.
3. Rotate the front cover toward the computer until the bezel–grips on the right edge of the cover snap into place, and then release the latch.
4. Follow the procedure in "After Working on Your Computer" on page 17.



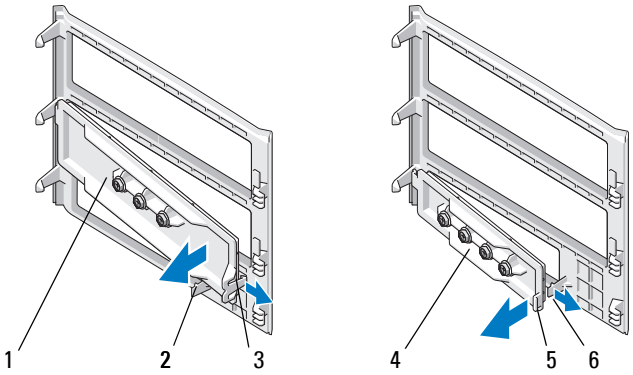
1 bezel clamps (3) 2 bezel

3 bezel latch

Removing a Drive Bezel Insert

NOTE: Do not discard the screws located on the inside of the bezel insert tab. You need these screws to secure the replacement drive in the drive bay.

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the drive bezel (see "Removing the Drive Bezel" on page 25) and place it facedown on a flat surface.
3. Holding the bezel insert tab for leverage, use a plastic scribe to gently disengage the right-side grip for the bezel insert.
4. Swing the bezel insert to the left to disengage the left-side grip.



1 5.25-inch drive bezel insert
2 bezel insert tab
3 bezel insert grip
4 3.5-inch drive bezel insert
5 bezel insert tab
6 bezel insert grip

Replacing a Drive Bezel Insert

NOTE: This procedure assumes that you have completed the removal procedure first.

1. Place the drive bezel face-down on a flat surface.
2. Holding the bezel insert almost vertically, reseat the left bezel insert grip along the left edge of the rear of the bezel.
3. Push the right side of the bezel insert down until it snaps into place.
4. Follow the procedure in "After Working on Your Computer" on page 17.

4

Cards

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

PCI and PCI Express Cards

Your computer supports a PS/2 serial-port adapter and provides the following slots for PCI Express and PCI cards:

- One PCI Express x16 card slot (SLOT1)
- Two PCI card slots (SLOT2, SLOT3)

An optional riser card and riser card cage is available for the desktop computer.

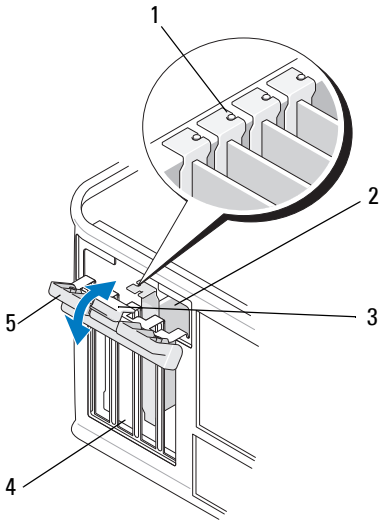
NOTE: For card slot locations, see "Mini Tower Computer System Board Components" on page 13 or "Desktop Computer System Board Components" on page 15.

- If you are installing or replacing a card, follow the procedures in this section.
- If you are removing but not replacing a card, see "Removing a PCI or PCI Express Card From a Mini Tower Computer" on page 30 or "Removing a PCI or PCI Express Card From a Desktop Computer" on page 35.
- If you are removing a card, you must also remove the current driver for the card from the operating system. For instructions, see the documentation that came with the card.

- If you are installing a card, ensure that the appropriate driver for the card is also installed. For instructions, see the documentation that came with the card.

Removing a PCI or PCI Express Card From a Mini Tower Computer

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).
3. Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.



1	alignment guides (4)	2	card
3	release lever	4	card slots (4)
5	card retention latch		

4. If necessary, disconnect any cables connected to the card.
5. If you are removing the card permanently:
   a. Install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets in empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer, and maintain the airflow that cools your computer.

b Follow the procedure in "After Working on Your Computer" on page 17.

c Uninstall the card's driver. For instructions, see the documentation that came with the card.

6 If you removed a sound card:

a Enter the system setup program, go to **Onboard Devices** and select **Integrated Audio**, and then change the setting to **On**. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

b Connect external audio devices to the audio connectors on the back panel of the computer. For assistance with back panel connections, see your *Setup and Quick Reference Guide*.

7 If you removed an add-in network connector:

a Enter the system setup program, go to **Onboard Devices** and select **Integrated NIC**, and then change the setting to **On**. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

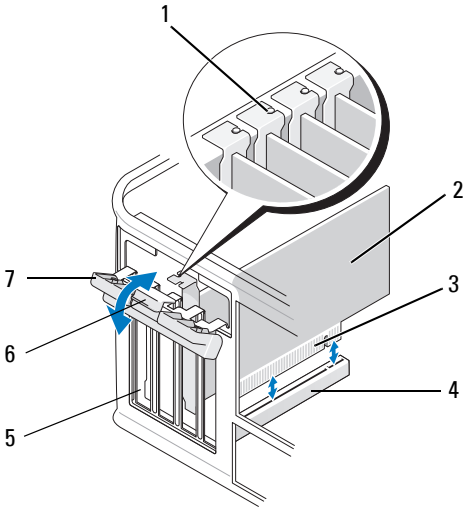
b Connect the network cable to the integrated connector on the back panel of the computer. For assistance with back panel connections, see your *Setup and Quick Reference Guide*.

Installing or Replacing a PCI or PCI Express Card in a Mini Tower Computer

NOTE: If you are replacing a card, uninstall the driver for the existing card. For instructions, see the documentation that came with the card.

1 Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).

2 Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.



1	alignment guide	2	card
3	card-edge connector	4	card connector
5	card slots (4)	6	release lever
7	card retention latch		

3 If you are installing a new card, remove the filler bracket covering the empty card slot. To remove a filler bracket, gently insert a scribe under the top edge of the bracket.

4 If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card.

- For a PCI card, grasp the card by its top corners, and ease it out of its connector.
- For a PCI Express card, pull the securing tab, grasp the card by its top corners, and ease it out of its connector.

5 If your card includes a card retention bar, remove the bar. Gently pull the securing tab, grasp the card by its top corners, and ease it out of its connector.

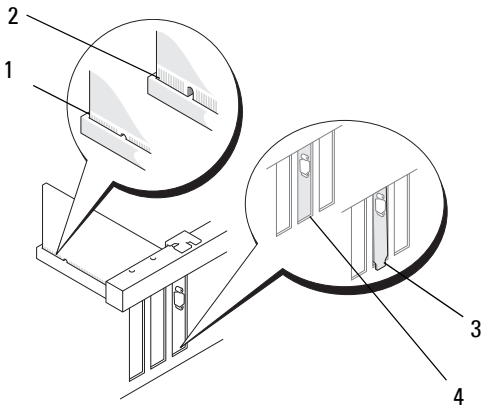
6 Prepare the new card for installation.

NOTE: For information on configuring the card, making internal connections, or customizing it for your computer, see the documentation that came with the card.

WARNING: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

7 If you are installing the card into the PCI Express x16 card connector, position the card so that the securing slot is aligned with the securing tab, and gently pull the securing tab.

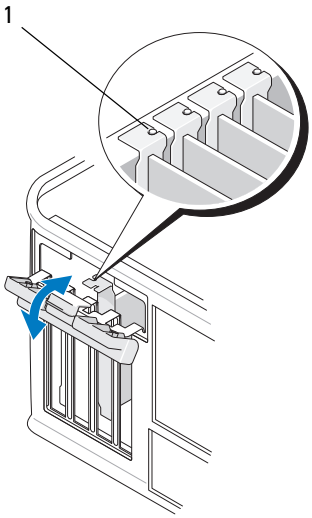
8 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1	alignment guide	2	card
3	card-edge connector	4	card connector

9 Before you lower the card retention mechanism, ensure:

- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch the top of the card or filler bracket fits around the alignment guide.



1 alignment guides (4)

10 Secure the card(s) by closing the card retention latch and snapping it into place.

CAUTION: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

11 Connect any cables that should be attached to the card.

For information about the card's cable connections, see the documentation the card.

12 Follow the procedure in "After Working on Your Computer" on page 17.

13 IIf you installed a network adapter card and want to turn off the integrated network adapter, use the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com.**

CAUTION: If your computer supports Active Management Technology (AMT), disabling the integrated network adapter also disables AMT functionality.

14 Install any drivers required for the card as described in the card documentation.

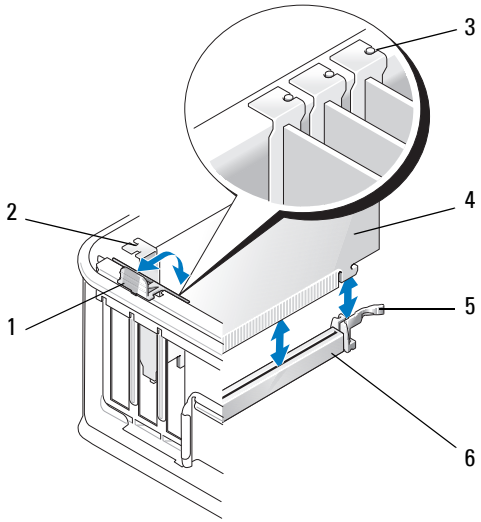
Removing a PCI or PCI Express Card From a Desktop Computer

NOTE: If applicable, see "Removing a Card From the Optional Riser-Card Cage" on page 50.

1 Follow the procedure in "Before Working on Your Computer" on page 9.

2 Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).

3 Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.



1	release lever	2	filler bracket
3	alignment guides (3)	4	card
5	card retention latch	6	system board connector

4 If necessary, disconnect any cables connected to the card.

5 If you are replacing a PCI Express x16 card, remove the installed card by gently pulling the release lever away from the card until you release the securing tab from the dent in the card.

6 Grasp the card by its top corners, and ease it out of its connector.

7 If you are permanently removing the card:

a Install a filler bracket to cover the empty card slot.

CAUTION: Installing filler brackets in empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer and maintain the airflow that cools your computer.

b Follow the procedure in "After Working on Your Computer" on page 17.

c Uninstall the card's driver. For instructions, see the documentation that came with the card.

d For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at**support.dell.com.**

Installing or Replacing a PCI or PCI Express Card in a Desktop Computer

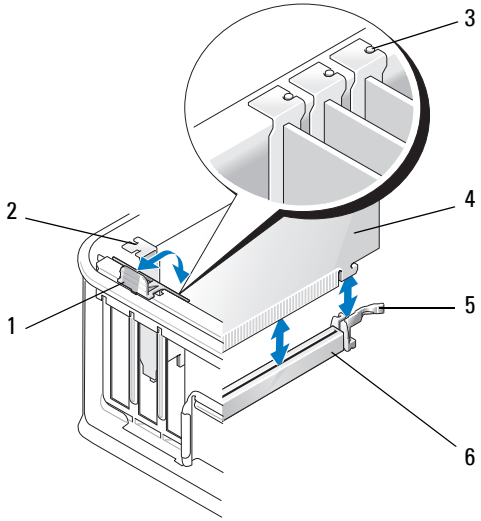
NOTE: If applicable, see "Installing or Replacing a Card in the Optional Riser-Card Cage" on page 52.

NOTE: If you are installing a card to replace one already installed in the computer, you must first remove the installed card (see "Removing a PCI or PCI Express Card From a Desktop Computer" on page 35 or "Removing a Card From the Optional Riser-Card Cage" on page 50).

1 Follow the procedure in "Before Working on Your Computer" on page 9.

2 Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).

3 Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.

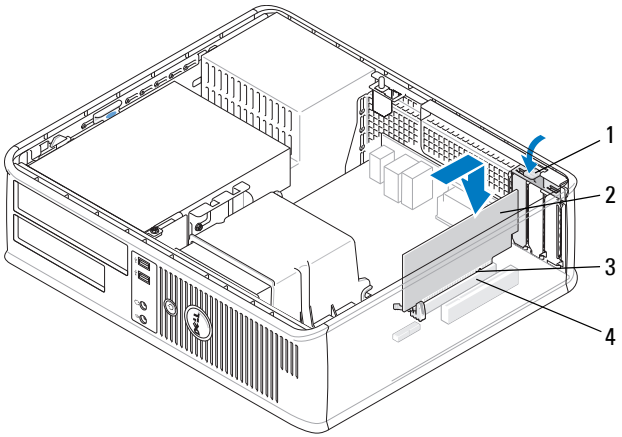


1	release lever	2	filler bracket
3	alignment guides (3)	4	card
5	card retention latch	6	system board connector

4 If you are installing a new card, remove the filler bracket covering the empty card slot. To remove a filler bracket, gently insert a scribe under the top edge of the bracket.

5 Prepare the new card for installation.

NOTE: For information on configuring the card, making internal connections, or customizing it for your computer, see the documentation that came with the card.

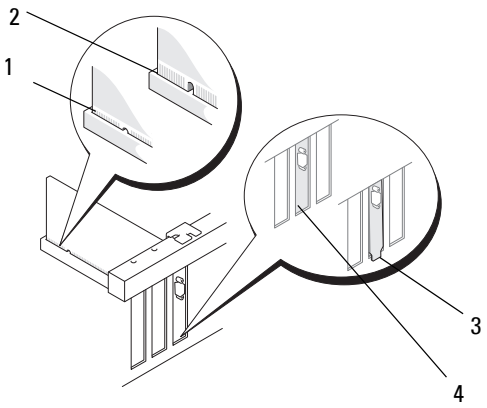


1	release lever on card retention latch	2	card
3	card-edge connector	4	card connector

WARNING: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

6 If you are installing a PCI Express x16 card, hold the securing-tab release lever away from the card connector as you insert the new card into the connector slot.

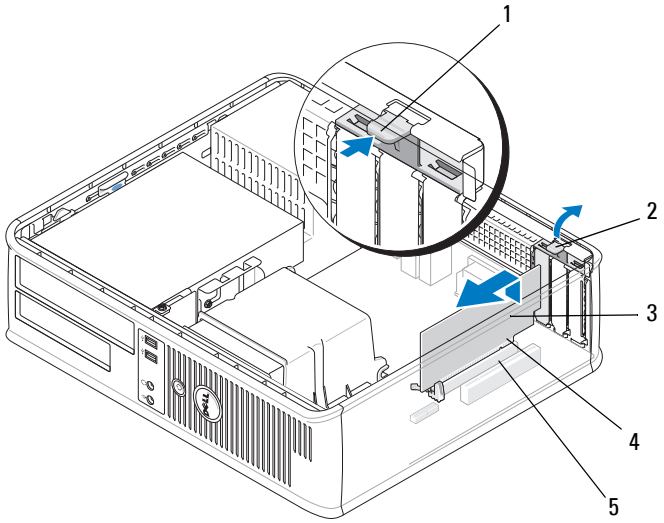
7 Place the card in the connector and press down firmly. Using the following illustration as a guide, ensure that the card is fully seated in the slot.



1	card fully seated	2	card not fully seated
3	improperly seated bracket	4	properly seated bracket

NOTE: If you are installing a PCI Express x16 card, ensure that the securing tab on the connector's release lever fits into the notch on the front end of the card.

8 To secure the cards, gently rotate the release lever downward to move the card retention latch into place.



1	release lever	2	card retention latch
3	card	4	card-edge connector
5	card connector		

CAUTION: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

9 Connect any cables that should be attached to the card.

10 Follow the procedure in "After Working on Your Computer" on page 17.

11 IIf you installed a network adapter card and want to turn off the integrated network adapter, use the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com.**

CAUTION: If your computer supports Active Management Technology (AMT), disabling the integrated network adapter also disables AMT functionality.

12 Install any drivers required for the card as described in the card documentation.

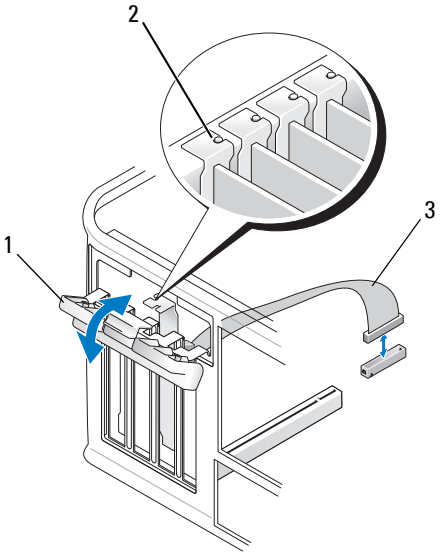
PS/2 Serial-Port Adapter

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing a PS/2 Serial-Port Adapter From a Mini Tower Computer

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).
3. Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.



1 card retention latch 2 alignment guide

3 PS/2 serial adapter cable

4 Disconnect the PS/2 serial-port cable from the system board (see "Mini Tower Computer System Board Components" on page 13).

5 If necessary, disconnect any external cables connected to the adapter.

6 Ease the PS/2 serial-port adapter bracket out of its slot.

7 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets in empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer and maintain the airflow that cools your computer.

8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

10 Follow the procedure in "After Working on Your Computer" on page 17.

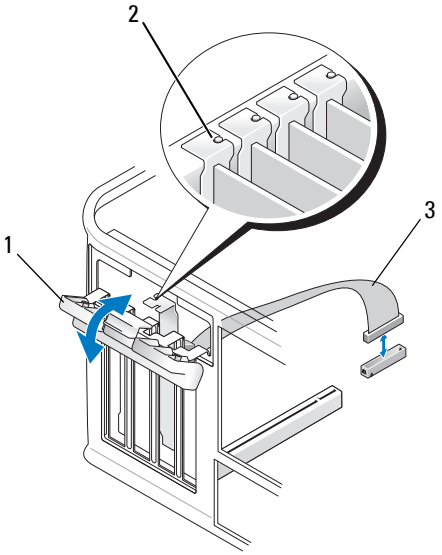
Installing or Replacing a PS/2 Serial-Port Adapter in a Mini Tower Computer

NOTE: If you are replacing a card, uninstall the driver for the existing card. For instructions, see the documentation that came with the card.

1 Follow the procedure in "Before Working on Your Computer" on page 9.

2 Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).

3 Gently lift the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.



1	card retention latch	2	alignment guide
3	PS/2 serial adapter cable		

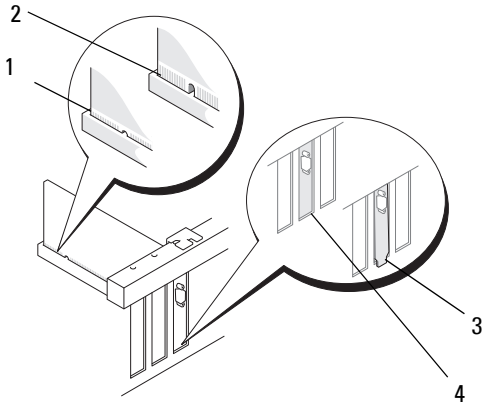
4 Remove the filler bracket (if applicable).

NOTE: For information on configuring the adapter, making internal connections, or customizing it for your computer, see the documentation that came with the adapter.

5 Align the PS/2 serial-port adapter bracket in the slot and press down firmly. Ensure that the adapter is fully seated in the slot.

Before you close the card retention mechanism, ensure that:

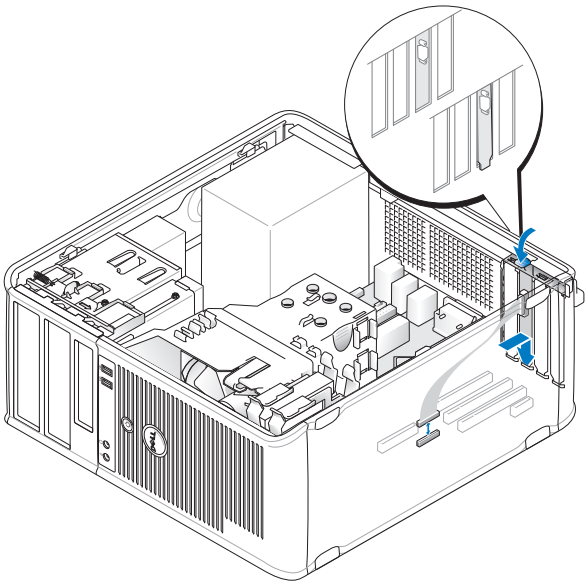
- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch in the top of the card or filler bracket fits around the alignment guide.



6 Secure the card(s) by closing the card retention latch and snapping it into place.

CAUTION: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

7 Connect the adapter cable to the serial-port adapter connector on the system board (for connector locations, see "Mini Tower Computer System Board Components" on page 13).

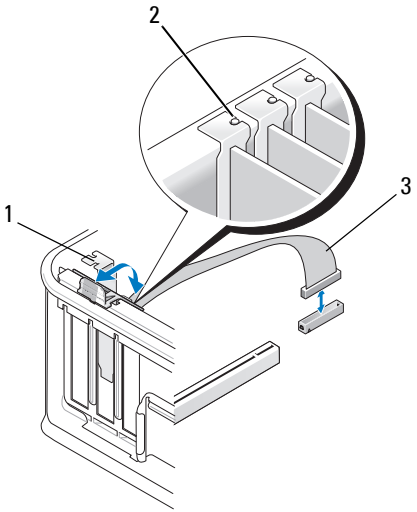


8 Follow the procedure in "After Working on Your Computer" on page 17.

Removing a PS/2 Serial-Port Adapter From a Desktop Computer

NOTE: If applicable, see "Removing a Card From the Optional Riser-Card Cage" on page 50.

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).
3. Gently lift the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.
4. Disconnect the PS/2 serial-port cable from the system board (see "Desktop Computer System Board Components" on page 15).



1	card retention latch	2	alignment guide
3	PS/2 serial adapter cable		

5. Ease the PS/2 serial-port adapter bracket out of its slot.
6. If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets in empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer and maintain the airflow that cools your computer.

7 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch in the top of the card or filler bracket fits around the alignment guide.

8 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

9 Follow the procedure in "After Working on Your Computer" on page 17.

Installing or Replacing a PS/2 Serial-Port Adapter in a Desktop Computer

NOTE: If applicable, see "Installing or Replacing a Card in the Optional Riser-Card Cage" on page 52.

NOTE: If you are replacing a card, uninstall the driver for the existing card. For instructions, see the documentation that came with the card.

1 Follow the procedure in "Before Working on Your Computer" on page 9.

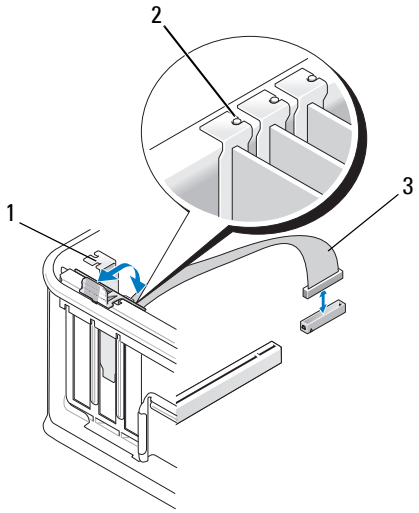
2 Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).

3 Gently lift the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.

4 Remove the filler bracket (if applicable).

NOTE: For information on configuring the adapter, making internal connections, or customizing it for your computer, see the documentation that came with the adapter.

5 Align the PS/2 serial-port adapter bracket in the slot and press down firmly. Ensure that the adapter is fully seated in the slot.



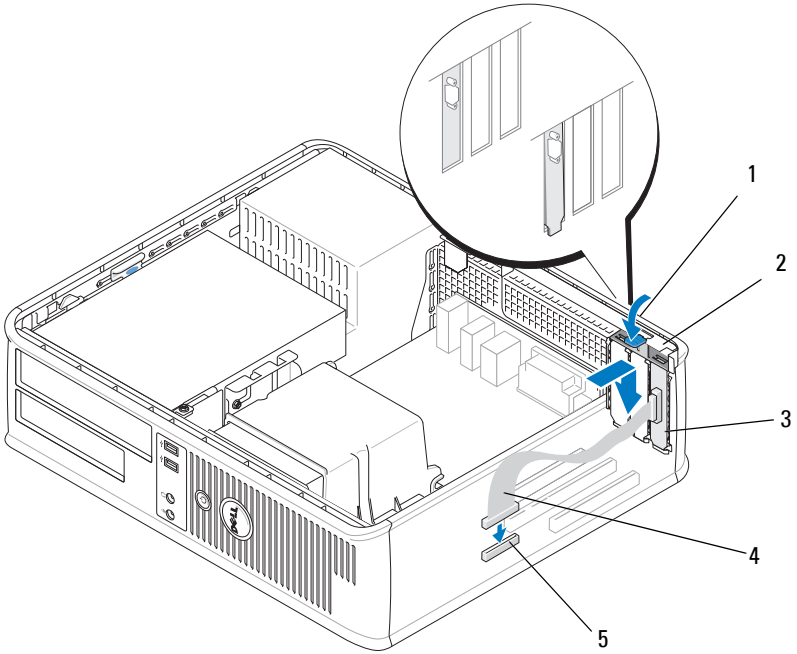
1	card retention latch	2	alignment guide
3	PS/2 serial adapter cable		

6 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch in the top of the card or filler bracket fits around the alignment guide.

7 Secure the card(s) by closing the card retention latch and snapping it into place.

CAUTION: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.



1	release lever	2	adapter retention latch
3	PS/2 serial-port adapter bracket	4	serial-port adapter connector
5	serial-port adapter system board connector		

8 Connect the adapter cable to the PS/2 serial-port adapter connector on the system board (see "Desktop Computer System Board Components" on page 15).

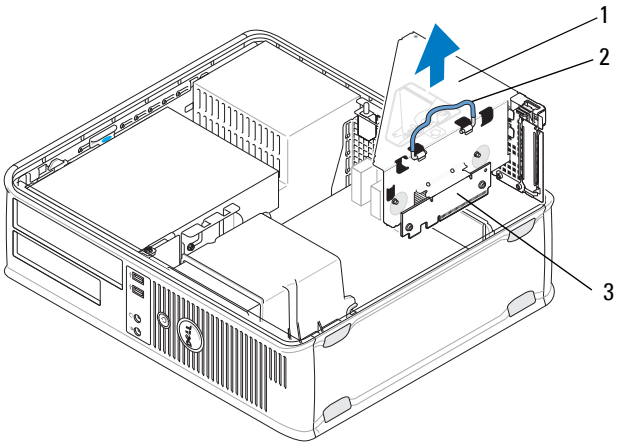
NOTE: For information about the cable connections, see the documentation for the PS/2 serial-port adapter.

9 Follow the procedure in "After Working on Your Computer" on page 17.

Removing a Card From the Optional Riser-Card Cage

NOTE: The riser-card cage is an option for the desktop computer only.

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).
3. Remove the riser-card cage:
   a. Check any cables connected to cards through the back panel openings.
   b. Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage
2 handle
3 riser cards (2)

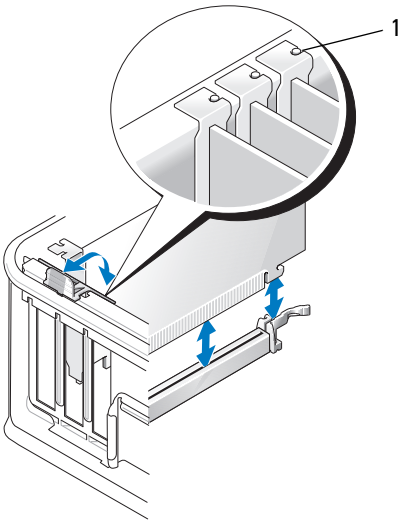
4. Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.
5. Disconnect any card cables from the system board (see "Desktop Computer System Board Components" on page 15).
6. Grasp the card by its top corners, and ease it out of its connector.

7 If you are removing a card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets in empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer and maintain the airflow that cools your computer.

8 Before you close the card retention mechanism, ensure:

- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch in the top of the card or filler bracket fits around the alignment guide.



1 alignment guides (3)

9 Secure the card(s) by closing the card retention latch and snapping it into place.

10 Replace the riser-card cage:

a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.

b Ensure that the riser-card connectors are fully seated in the connectors on the system board.

c Rotate the riser-card cage handle to the down position.

Installing or Replacing a Card in the Optional Riser-Card Cage

NOTE: The riser-card cage is an option for the desktop computer only.

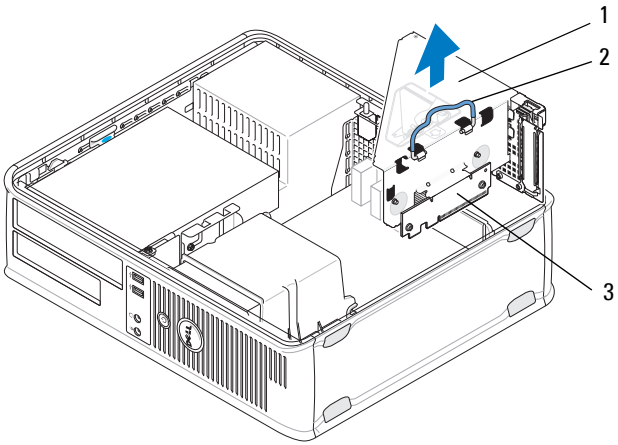
1 Follow the procedure in "Before Working on Your Computer" on page 9.

2 Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).

3 Remove the riser-card cage:

a Disconnect any cables connected to cards through the back panel openings.

b Rotate the riser-card cage handle up and gently pull on the handle to lift the riser-card cage up and away from the computer.



1 riser-card cage
2 handle
3 riser cards (2)

4 Gently push the release lever on the card retention latch to pivot the latch open. The latch remains in the open position.

5 If you are installing a new card, remove the filler bracket to create an empty card-slot opening.

6 If you are replacing a card that is already installed in the computer, remove the card (see "Removing a PCI or PCI Express Card From a Desktop Computer" on page 35 or "Removing a PS/2 Serial-Port Adapter From a Desktop Computer" on page 46).

7 If necessary, disconnect any cables connected to the adapter.

WARNING: To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards or adapters.

8 Align the card in the slot and press down firmly. Ensure that the adapter is fully seated in the slot.

9 Before you close the card retention mechanism, ensure:

- The tops of all cards and filler brackets are flush with the alignment guide.
- The notch in the top of the card or filler bracket fits around the alignment guide.

10 Secure the card(s) by closing the card retention latch and snapping it into place.

CAUTION: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

11 Connect any card cables to the system board as appropriate (see "Desktop Computer System Board Components" on page 15).

12 Replace the riser-card cage:

a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.

b Ensure the riser-card connectors are fully seated in the connectors on the system board.

c Rotate the riser-card cage handle downward to secure it into place.

13 Connect any disconnected cables.

14 Follow the procedure in "After Working on Your Computer" on page 17.

15 Install any drivers required for the card. For instructions on installing driver, see the documentation that came with the card.

5

Drives

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

About the Drives

The mini tower computer supports a combination of the following devices:

- Two internal 3.5-inch SATA hard drives
- Two external 5.25-inch drives
- One optional floppy drive or an optional media card reader

The desktop computer supports a combination of the following devices:

- One internal 3.5-inch SATA hard drive
- One external 5.25-inch drive
- One optional floppy drive or an optional media card reader

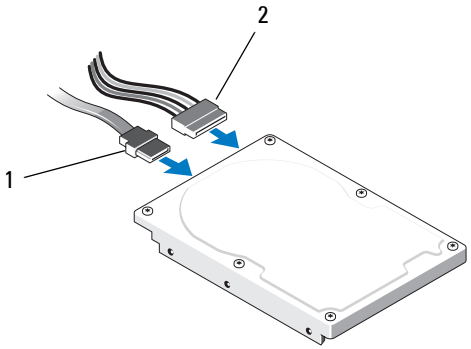
Recommended Drive Cable Connections

- Connect SATA hard drives to connectors labeled "SATA0" and "SATA1" on the system board.
- Connect a SATA optical drive to the connector labeled "SATA2" on the system board.

Connecting Drive Cables

When you install a drive, you connect two cables, the power cable and the data cable to the back of the drive.

Power Connector

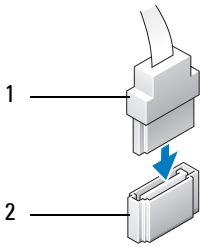


1 power cable 2 data connector

Drive Interface Connectors

The drive cable connectors are keyed for correct insertion. Properly align the cable connector key on the cable and the drive before connecting.

SATA Connector



1 interface cable 2 interface connector

Connecting and Disconnecting Drive Cables

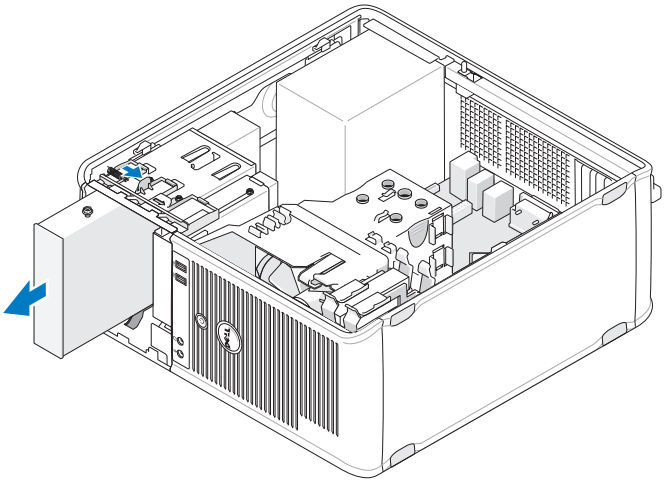
When connecting and disconnecting a SATA data cable, disconnect the cable using the pull-tab.

The SATA interface connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector.

Optical Drive

Removing an Optical Drive From the Mini Tower Computer

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).
3. Remove the drive bezel (see "Removing the Drive Bezel" on page 25).
4. Disconnect the optical drive data cable from the system board connector.
5. Disconnect the power cable and the optical drive data cable from the back of the drive.
6. Remove the screw securing the optical drive to the optical drive bay.
7. Slide the optical drive out through the front of the computer.



8. If you are removing the drive permanently:
   a. Install the drive panel insert (see "Installing an Optical Drive Panel Insert" on page 59).

b Remove the unused data cable from the computer.

c Install a drive panel insert to cover the empty drive bay opening (see "Installing an Optical Drive Panel Insert" on page 59).

d Follow the procedure in "After Working on Your Computer" on page 17.

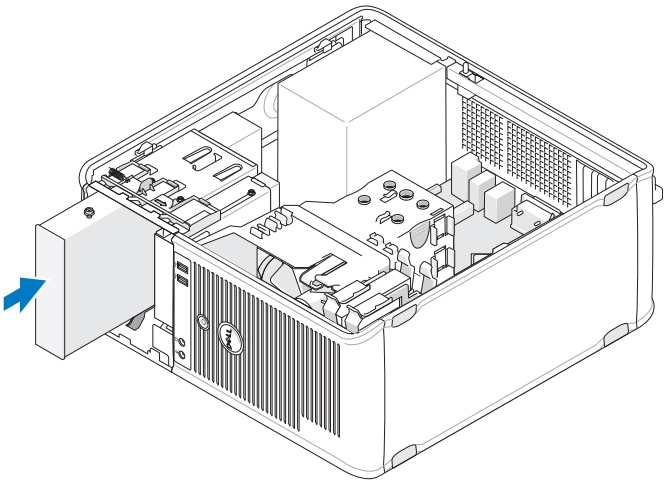
e Update the drive configuration information in the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

Replacing or Adding an Optical Drive in the Mini Tower Computer

NOTE: This procedure assumes that you have completed the removal procedure first.

1 If necessary, remove the drive panel insert (see "Removing an Optical Drive Panel Insert" on page 59).

2 Gently slide the optical drive into place, aligning the screw holes in the optical drive bay and optical drive.



3 Tighten the screw securing the optical drive.

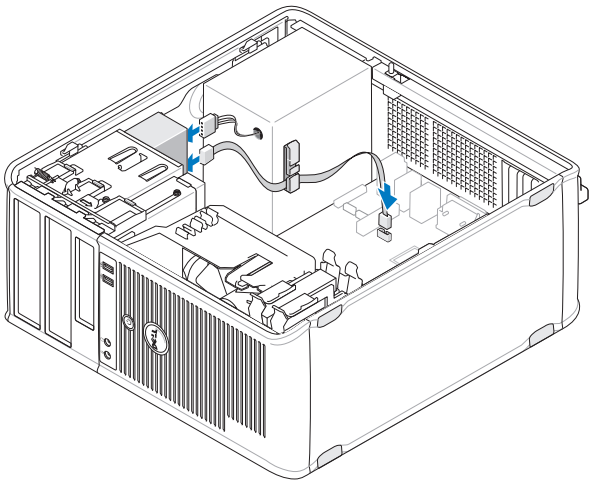
4 Connect the power and data cables to the drive.

5 Connect the data cable to the system board connector on the system board.

6 Follow the procedure in "After Working on Your Computer" on page 17.

7 Update the drive configuration information in the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

8 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).



Removing an Optical Drive Panel Insert

Release the optical drive panel insert by pushing it out of the chassis.

Installing an Optical Drive Panel Insert

1 Align the insert with the empty bay opening.

2 Install two screws to secure the optical panel insert in place.

NOTE: To comply with FCC regulations, it is recommended that you replace the optical drive panel insert whenever you remove the optical drive from the computer.

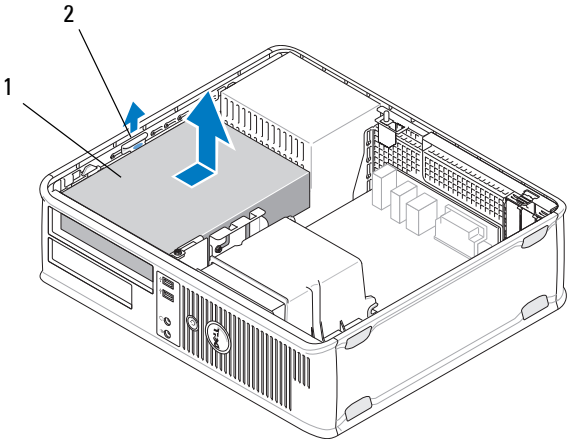
Removing the Optical Drive From the Desktop Computer

1 Follow the procedure in "Before Working on Your Computer" on page 9.

2 Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).

CAUTION: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

3 Pull up on the drive release latch, slide the drive toward the back of the computer, and lift the drive from the computer.



1 optical drive 2 drive release latch

4 Disconnect the power and data cables from the back of the drive.

Replacing the Optical Drive in the Desktop Computer

NOTE: This procedure assumes that you have completed the removal procedure first.

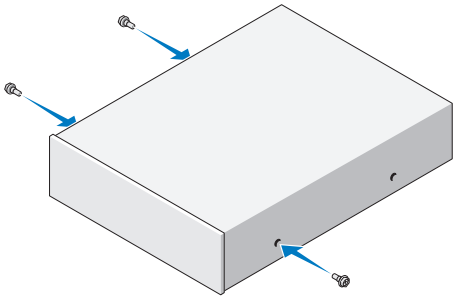
1 Unpack the drive and prepare it for installation. Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

2 If you are installing a new drive:

a Remove the inserts (see "Removing an Optical Drive Panel Insert" on page 59).

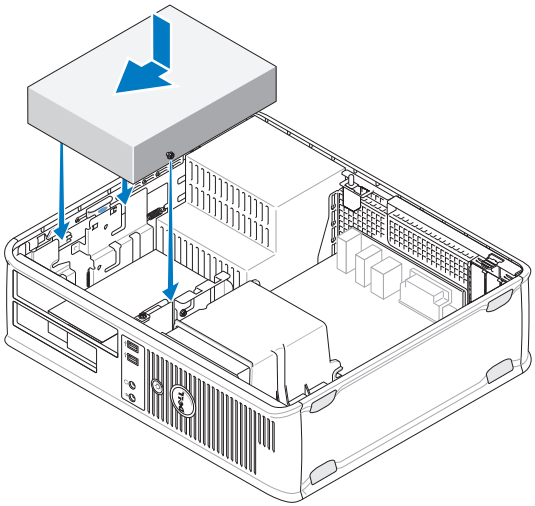
b Insert the three shoulder screws removed from the insert into the sides of the new drive and tighten them.

c Lift the drive release latch up and insert the new optical drive.



3 Connect the power and data cables to the drive.

4 Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.



5 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

6 Follow the procedure in "After Working on Your Computer" on page 17.

7 Update the configuration information in the system setup program by setting the appropriate **Drive** option (0 or 1) under **Drives**. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

8 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).

Floppy Drive or Media Card Reader

Removing a Floppy Drive or Media Card Reader From the Mini Tower Computer

⚠ **WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.**

⚠ **WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.**

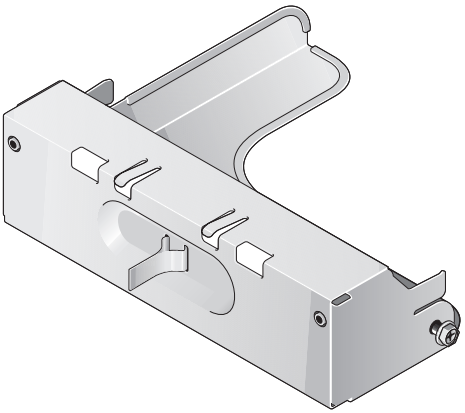
1 Disable the floppy drive or media card reader in the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

2 Follow the procedure in "Before Working on Your Computer" on page 9.

3 Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).

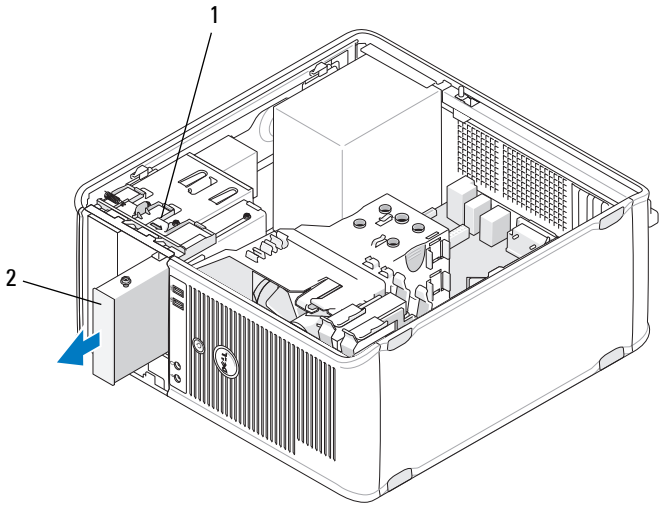
4 Remove the drive panel insert by sliding the drive release latch downward.

Drive Panel Insert



5 Disconnect the power and data cables from the back of the floppy drive.

6 Grasp the drive release latch and slide it toward the bottom of the computer until the drive panel snaps open. While holding the drive release latch in place, slide the drive out of the computer.



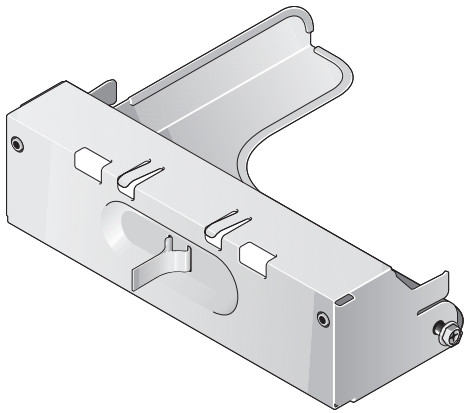
1 drive release latch 2 floppy drive

Replacing or Adding a Floppy Drive or Media Card Reader in the Mini Tower Computer

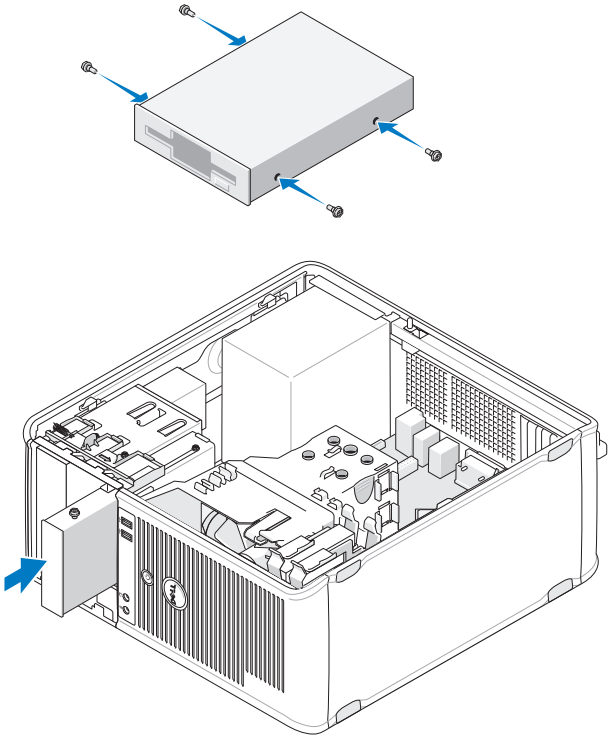
NOTE: This procedure assumes that you have completed the removal procedure first.

1. If you are replacing a floppy drive or media card reader, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.
2. If you are installing a new floppy drive or media card reader:
   a. Remove the drive panel insert installed in the drive bay.
   b. Remove the four shoulder screws from the drive panel insert.
   c. Attach the shoulder screws to the new drive or media card reader.

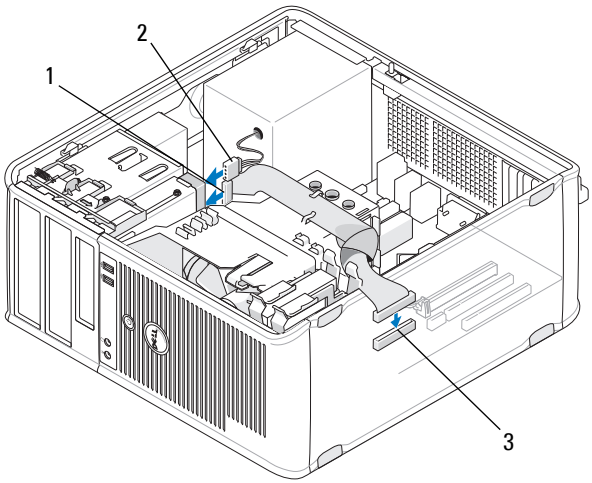
Drive Panel Insert



3. Align the shoulder screws on the floppy drive or media card reader with the shoulder screw guides in the bay, and gently slide the drive into the bay until it clicks into place.



4 Attach the power and data cables to the floppy drive or media card reader and to the system board.



1 data cable 2 power cable

3 floppy drive connector (DSKT)

5 Follow the procedure in "After Working on Your Computer" on page 17.

6 Enable the new floppy drive or media card reader in the system setup program. For information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

7 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).

Removing a Floppy Drive or Media Card Reader From the Desktop Computer

1 Follow the procedure in "Before Working on Your Computer" on page 9.

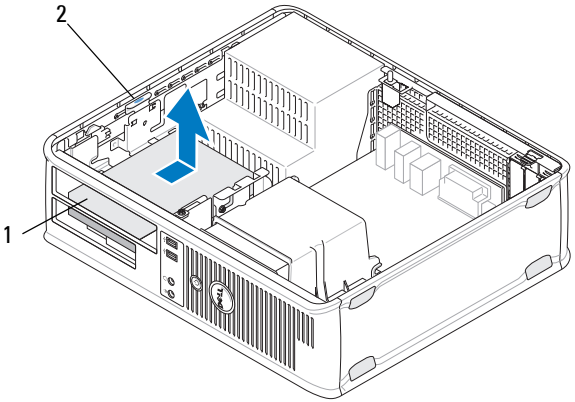
2 Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).

NOTE: Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connected to the optical drive.

3 Remove the optical drive and set it aside (see "Removing the Optical Drive From the Desktop Computer" on page 59).

CAUTION: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

4 Pull up on the drive release latch and slide the floppy drive or media card reader toward the back of the computer. Then, lift up to remove the drive from the computer.



1 floppy drive or media card reader 2 drive release latch

5 Disconnect the power and data cables from the back of the floppy drive or media card reader.

6 If you are removing the floppy drive or media card reader permanently:

a Install the drive panel insert by lowering it into the drive bay until it clicks into place.

b Remove the data cable from the system board and remove it from the computer.

c Follow the procedure in "After Working on Your Computer" on page 17.

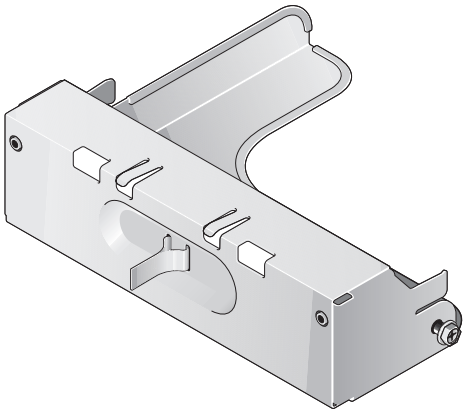
d Enter the system setup program to update the drive configuration information. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com.**

Replacing or Adding a Floppy Drive or Media Card Reader in the Desktop Computer

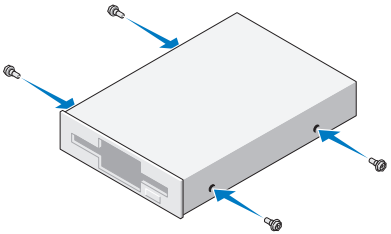
NOTE: This procedure assumes that you have completed the removal procedure first.

1. If you are installing a new floppy drive or media card reader:
   a. Remove the drive panel insert installed in the drive bay.
   b. Remove the four shoulder screws from the drive panel insert.
   c. Attach the shoulder screws to the new floppy drive or media card reader.

Drive Panel Insert

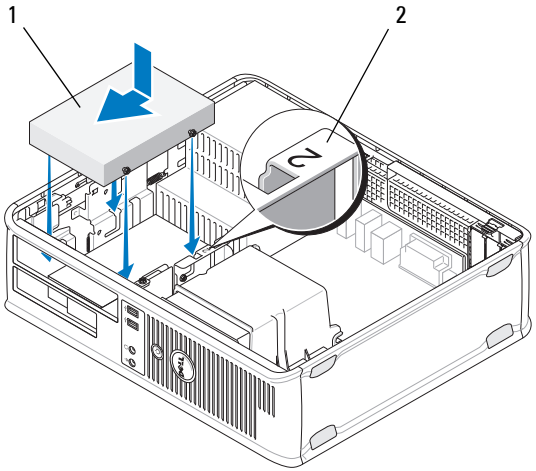


2. If you are replacing an existing floppy drive or media card reader, remove the four shoulder screws from the existing drive or media card reader.
3. Insert the four shoulder screws into the sides of the new floppy drive or media card reader, and tighten them.



4 Attach the power and data cables to the floppy drive or media card reader.

5 Align the shoulder screws with the screw guides on the chassis, and slide the drive into the bay (the slot labeled "2") until it clicks into place.



1 floppy drive 2 drive bay label

6 Replace the optical drive (see "Replacing the Optical Drive in the Desktop Computer" on page 60).

7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8 Follow the procedure in "After Working on Your Computer" on page 17.

9 Enable the new floppy drive or media card reader in the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

10 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).

Hard Drives

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

CAUTION: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

CAUTION: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

NOTE: Check the documentation for the drive to verify that it is configured for your computer.

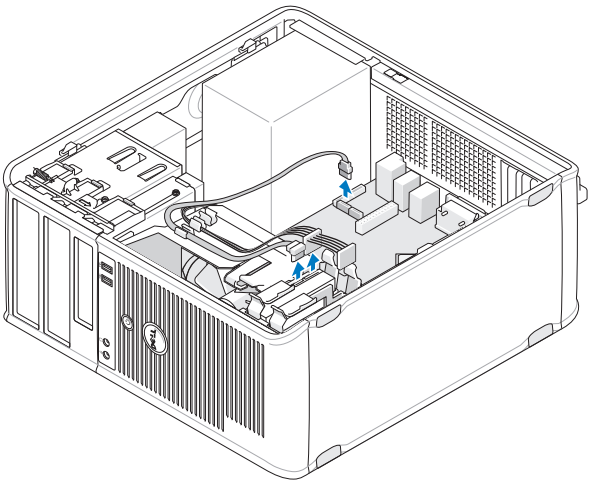
Removing a Hard Drive From the Mini Tower Computer

1 Follow the procedure in "Before Working on Your Computer" on page 9.

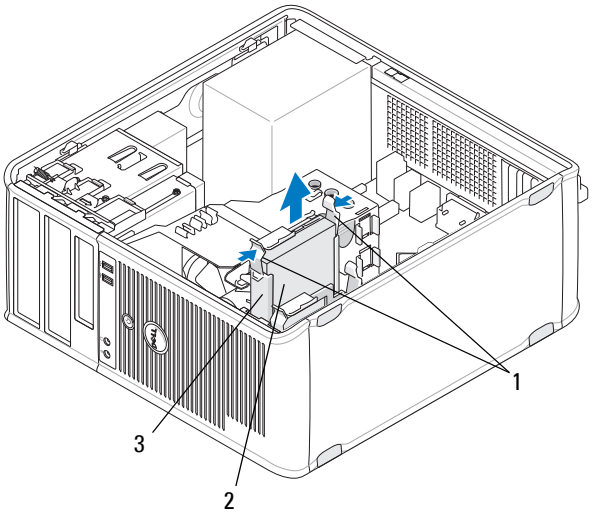
2 Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).

3 Disconnect the power and data cables from the drive.

4 Disconnect the data cable from the system board.



5 Press the release tabs inwards, and slide the drive out of the bay.



1 hard-drive bracket release tabs (2) 2 hard drive

3 hard drive bracket

6 If you are permanently removing this drive:

a Remove the data cable from the computer.

b Follow the procedure in "After Working on Your Computer" on page 17.

c Enter the system setup program and navigate to the **Drives** section. Under **Drive 0 through 3**, set **Drive** to the correct configuration. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**

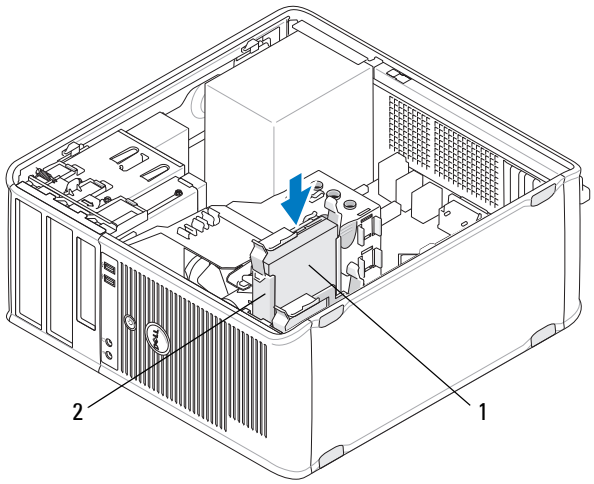
Replacing or Adding a Hard Drive in a Mini Tower Computer

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Check the documentation for the drive to verify that it is configured for your computer.

2 If you are replacing a hard drive, you must first swap the old drive for the new drive in the existing hard drive bracket (see "Hard Drive Bracket — Mini Tower Computer" on page 74).

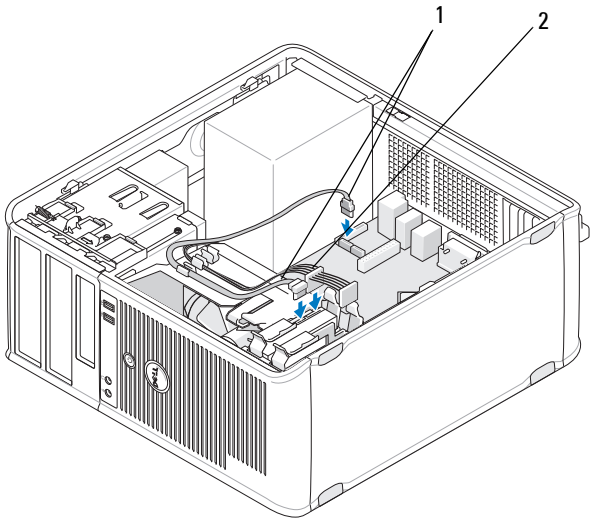
3 Slide the hard drive into the hard drive bay, gently push until it clicks in place.



1 hard drive 2 hard drive bracket

4 Connect the power and data cables to the drive.

5 Connect the data cable to the system board.



1 data cable 2 power cable

6 Check all cables to be certain that they are properly connected and firmly seated.

7 Follow the procedure in "After Working on Your Computer" on page 17.

NOTE: For instructions on installing any software required for drive operation, see the documentation that came with the drive.

8 Enter the system setup program and update the drive configuration. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

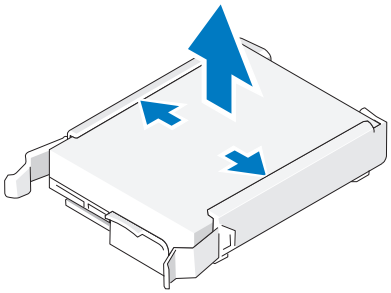
9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).

Hard Drive Bracket — Mini Tower Computer

If you are replacing the hard drive, you must replace the old hard drive with the new hard drive in the hard drive bracket before installing it in the computer.

1 Place the hard drive in its bracket face-down on a flat surface.

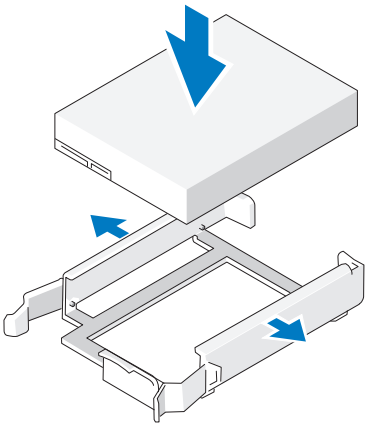
2 While gently pulling the edges of the bracket away from the hard drive, lift the hard drive out of the bracket.



3 Place the hard drive bracket on a flat surface, with the label face-up.

4 With the top edge of the hard drive oriented toward the bracket tabs, seat the left edge into the bracket, inserting the pins on the bracket into the pinholes on the hard drive.

5 Pull the right edge of the bracket out and seat the right edge of the hard drive, inserting the pins on the bracket into the pinholes on the hard drive.



Removing a Hard Drive From a Desktop Computer

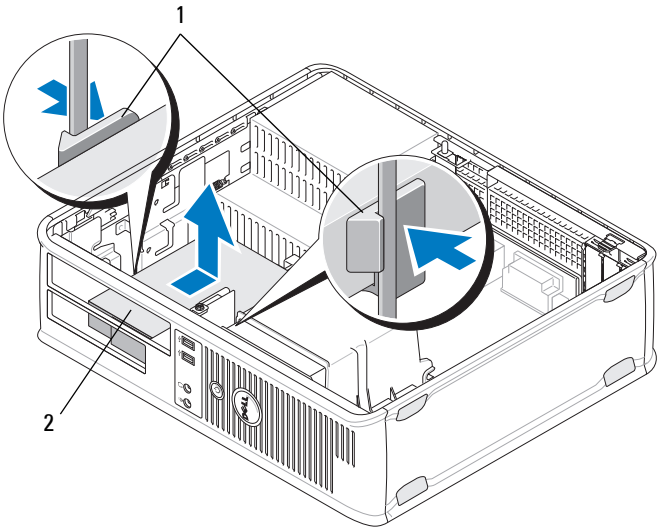
CAUTION: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

1. Check the documentation for the drive to verify that it is configured for your computer.
2. Follow the procedure in "Before Working on Your Computer" on page 9.
3. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).

CAUTION: Since the following steps do not require the complete removal of the optical drive and the floppy drive, it is not necessary to disconnect the cables connecting the two drives.

4. Remove the optical drive from the bay and set it aside (see "Removing the Optical Drive From the Desktop Computer" on page 59).
5. Remove the floppy drive from the 3.5-inch bay and set it aside (see "Removing a Floppy Drive or Media Card Reader From the Desktop Computer" on page 66).
6. Press the two plastic securing clips on each side of the drive, and slide the drive toward the back of the computer.

CAUTION: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.



1	plastic securing clips (2)	2	hard drive

7 Lift the drive out of the computer.

8 Disconnect the power and data cables from the drive.

Replacing or Adding a Hard Drive in a Desktop Computer

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Check the documentation for the drive to verify that it is configured for your computer.

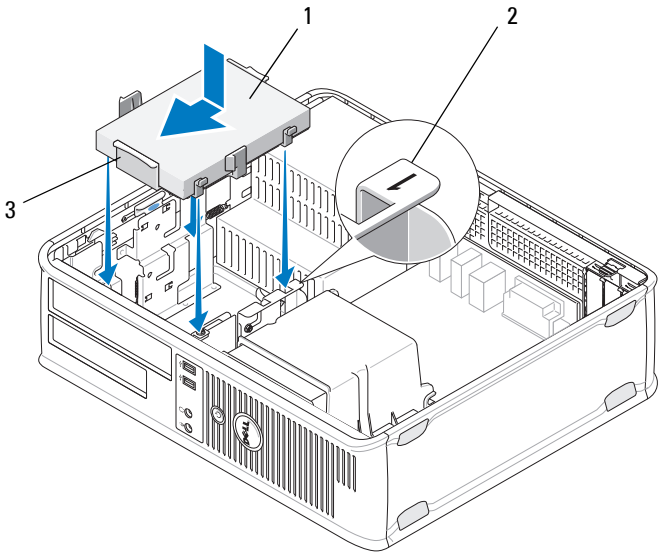
CAUTION: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

2 Unpack the replacement hard drive, and prepare it for installation.

3 If your replacement hard drive does not have the plastic hard-drive bracket attached, install the new drive in the existing bracket (see "Hard Drive Bracket — Desktop Computer" on page 79) .

4 Connect the power and data cables to the drive.

5 Locate the correct bay for the drive, and slide the drive into the bay until it clicks into place.



1 hard drive
2 drive bay label
3 hard drive bracket

6 Replace the floppy drive (see "Replacing or Adding a Floppy Drive or Media Card Reader in the Desktop Computer" on page 68).

7 Replace the optical drive (see "Replacing the Optical Drive in the Desktop Computer" on page 60).

8 Check all connectors to ensure they are properly attached and firmly seated.

9 Follow the procedure in "After Working on Your Computer" on page 17.

10 If the drive you just installed is the primary drive, insert a bootable disk into your boot drive.

11 Enter the system setup program and update the SATA port option under the **Drives** option list. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

12 Exit the system setup program, and reboot the computer.

13 Partition and format your drive.

NOTE: For instructions, see the documentation that came with your operating system.

14 Verify your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).

15 Install the operating system on the hard drive.

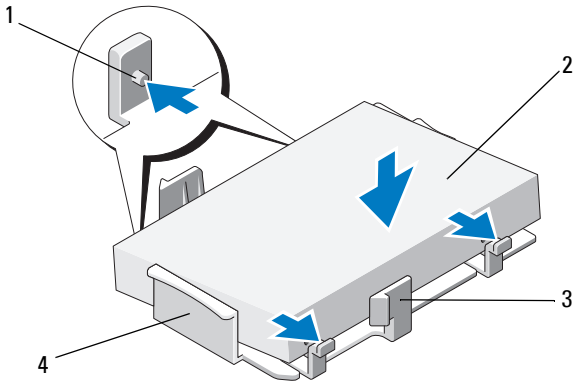
NOTE: For instructions, see the documentation that came with your operating system.

Hard Drive Bracket — Desktop Computer

1 Place the hard drive in its bracket face-down on a flat surface.

2 Remove the four screws securing the hard drive in the bracket.

3 Lift the hard drive out of the bracket.



1	screw holes (4)	2	hard drive
3	plastic securing clips (2)	4	hard drive bracket

4 Reseat the hard drive in the bracket with the label face-up.

5 Replace the four screws securing the hard drive to the bracket.

6

I/O Panel

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

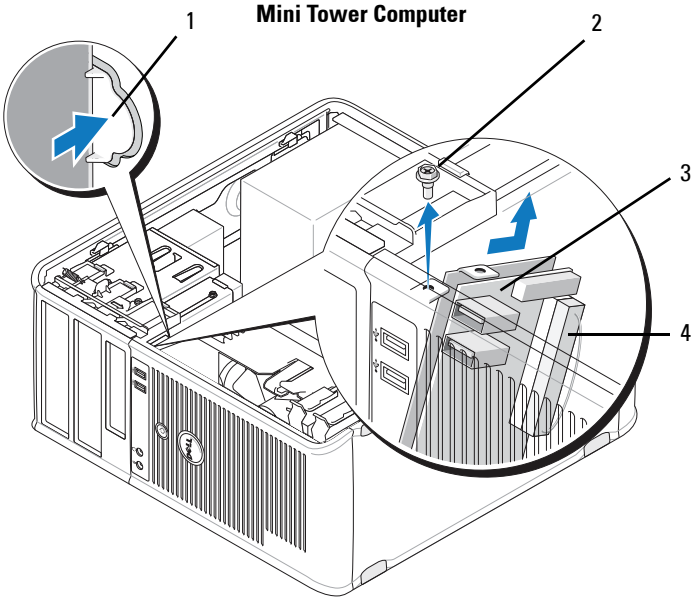
Removing the I/O Panel

NOTE: Note the routing of all cables as you remove them so that you can reroute them correctly when reinstalling the I/O panel.

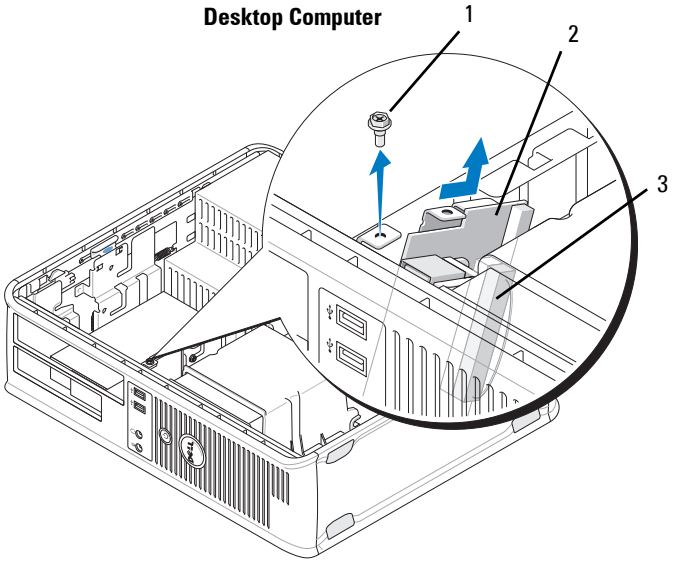
1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).

CAUTION: When sliding the I/O panel out of the computer, be careful to prevent damage to the cable connectors and the cable routing clips.

3. Disconnect all cables connecting the I/O panel to the system board.



1 I/O panel release button
2 securing screw
3 I/O panel
4 I/O cable connector



1 securing screw 2 I/O panel

3 I/O cable connector

4 Remove the screw securing the I/O panel to the computer chassis.

5 Press and hold the I/O panel release button (mini tower computer only).

6 Slide the I/O panel down to release the I/O panel clamp from the I/O panel clamp slot.

7 Remove the I/O panel from the computer.

Replacing the I/O Panel

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Reseat the I/O panel into its slot in the computer chassis.

CAUTION: Take care not to damage the cable connectors and the cable routing clips when sliding the I/O panel into the computer.

2 Align and slide the I/O panel clamp in the I/O panel clamp slot.

3 Replace and tighten the screw that secures the I/O panel.

4 Reconnect the cables to the system board.

5 Follow the procedure in "After Working on Your Computer" on page 17.

CAUTION: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6 Verify that the computer works correctly by running the Dell™ Diagnostics (see "Dell Diagnostics" on page 136).

7

Processor Heat-Sink Assembly

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against likelihood of electric shock, laceration by moving fan blades or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

Removing the Processor Heat-Sink Assembly

CAUTION: Unless a new heat sink is required for the new processor, reuse the original heat-sink assembly when you replace the processor.

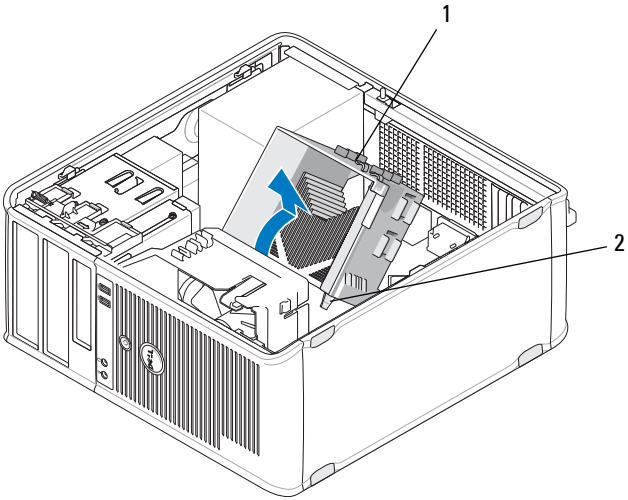
1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).
3. Disconnect the heat-sink assembly power cable from the system board.
4. Loosen the two captive screws securing the heat-sink assembly to the system board.

WARNING: Despite having a plastic shield, the heat-sink assembly may become very hot during normal operation. Allow sufficient time for it to cool before you touch it.

CAUTION: A strong thermal solution bond may exist between the processor and heat sink. Do not use excessive force to separate the heat-sink assembly from the processor to avoid damaging the processor.

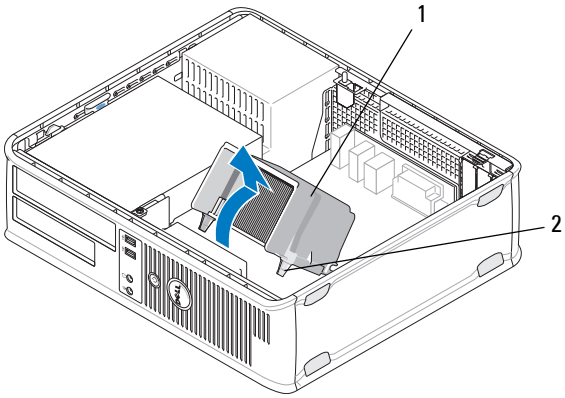
5. Rotate the heat-sink assembly outward on its hinges, away from the screw holes, detach it from the hinges, and lift it out of the computer chassis.
6. Lay the heat-sink assembly down on its top, with the thermal grease facing upward.

Mini Tower Computer



1 heat-sink assembly 2 captive screws (2)

Desktop Computer



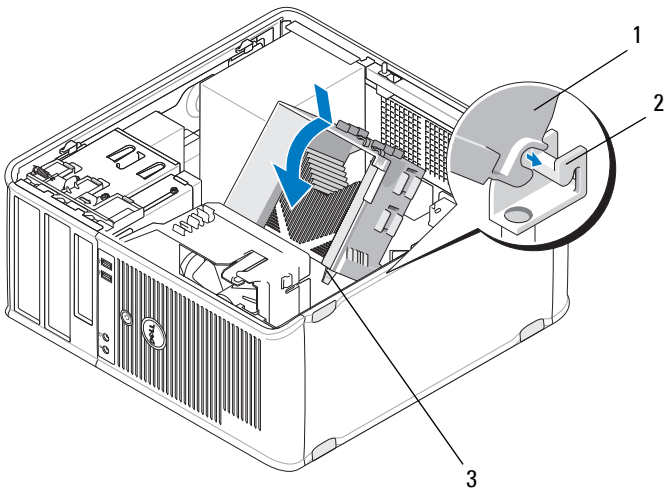
1 heat-sink assembly 2 captive screws (2)

Replacing the Processor Heat-Sink Assembly

NOTE: This procedure assumes that you have completed the removal procedure first.

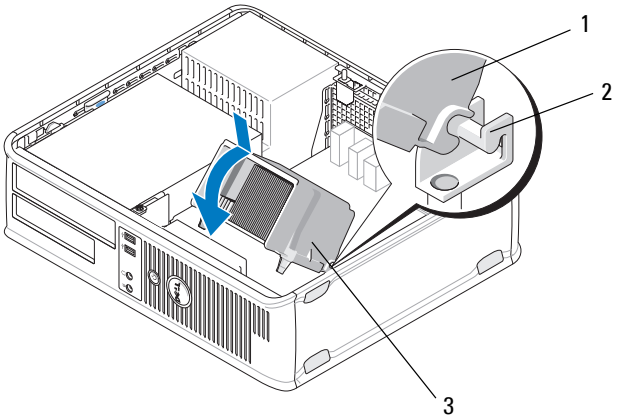
1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. If necessary, remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).
3. Apply thermal solution to the heat sink as needed.
4. Reseat the heat-sink assembly in the computer chassis by reattaching it to the hinges and aligning the two captive screws with the holes on the system board.

Mini Tower Computer



1 heat-sink assembly
2 heat-sink assembly bracket
3 captive screw housing (2)

Desktop Computer



1 heat-sink assembly
2 heat-sink assembly bracket
3 captive screw housing (2)

5 Tighten the two captive screws evenly to secure the heat-sink assembly to the system board.

CAUTION: Ensure that the heat-sink assembly is correctly seated and secured.

6 Reconnect the fan power cable to the system board (see "System Board Components" on page 13).

7 Follow the procedure in "After Working on Your Computer" on page 17.

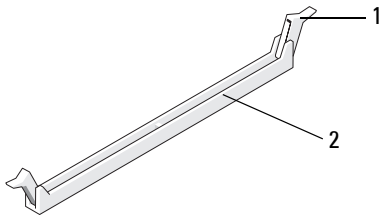
8

Memory Modules

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

Removing a Memory Module

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).
3. Locate the memory modules on the system board (see "System Board Components" on page 13).
4. Press the securing clip at each end of the memory module connector.



1 securing clip 2 memory module connector

5. Grasp the module by its edges and pull it upwards.

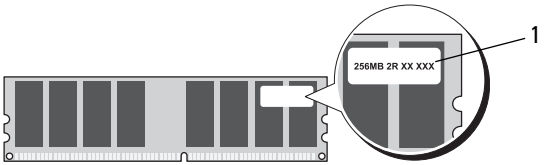
   If the module is difficult to remove, gently ease the module back and forth to remove it from the connector.

Replacing or Adding a Memory Module

CAUTION: Do not install ECC memory modules.

CAUTION: If you remove the original memory modules from the computer during a memory upgrade, keep them separate from any new modules that you may have, even if you purchased the new modules from Dell. Match the specifications of the memory modules you are installing. Otherwise, your computer may not start properly.

NOTE: If you install mixed pairs of PC2-5300 (DDR2 667-MHz) and PC2-6400 (DDR2 800-MHz) modules, the modules function at the speed of the slowest module installed. The specifications for the memory module are listed on a label on the module.

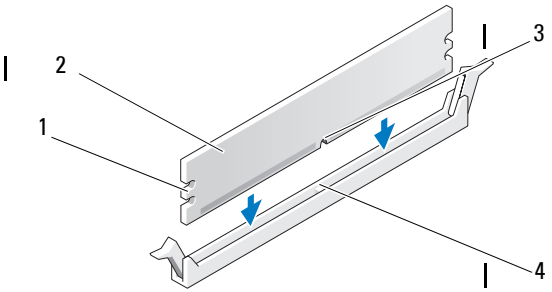


1 label

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Install a single memory module in the connector labeled "DIMM1," the connector closest to the processor, before you install modules in any other connector.

Align the notch on the bottom of the module with the crossbar in the connector..

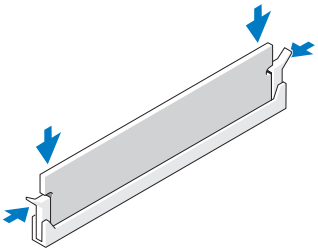


1	cutouts (2)	2	memory module
3	notch	4	crossbar

CAUTION: To avoid damage to the memory module, press the module straight down into the connector while you apply equal force to each end of the module.

2 Insert the module into the connector until the module snaps into position.

If you insert the module correctly, the securing clips snap into the cutouts at each end of the module.



3 Follow the procedure in "After Working on Your Computer" on page 17.

4 When the message appears stating that memory size has changed, press <F1> to continue.

5 Log on to your computer.

6 Right-click the **My Computer** icon on your Windows® desktop, and select **Properties**.

7 Click the **General** tab, and verify that the amount of memory (RAM) listed is correct.

8 You can also enter the system setup program to verify the new memory is recognized by the computer. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

9

Coin-Cell Battery

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

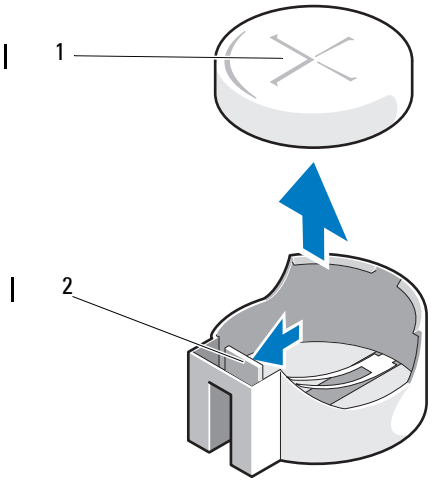
WARNING: A new battery can explode if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

A coin-cell battery maintains computer configuration, date, and time information. The battery can last several years. If you have to repeatedly reset time and date information after turning on the computer, replace the battery.

Removing the Coin-Cell Battery

1. Record the information on the screens in the system setup program so that you can restore the correct settings in step 4 of "Replacing the Coin-Cell Battery" on page 94. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.
2. Follow the procedure in "Before Working on Your Computer" on page 9.
3. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).
4. Locate the battery socket on the system board (see "System Board Components" on page 13).

CAUTION: If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.



1 battery (positive side) 2 battery retention tab

5 Insert a plastic scribe between the battery retention tab and the battery, and gently pry the batter loose.

6 Remove the battery from the system and properly dispose of it.

Replacing the Coin-Cell Battery

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Insert the edge of new battery, with "+" facing up, into the side of the socket opposite the battery retention tab.

2 Snap the battery into place. Ensure it is secured by the retention tab.

3 Follow the procedure in "After Working on Your Computer" on page 17.

4 Enter the system setup program to restore the settings you recorded in step 1 under the section Removing the Coin-Cell Battery and enter the correct date and time. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

10

Speakers

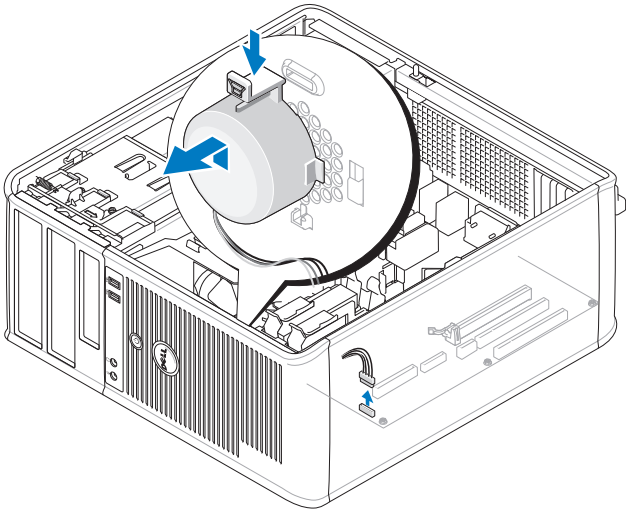
Removing a Speaker

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

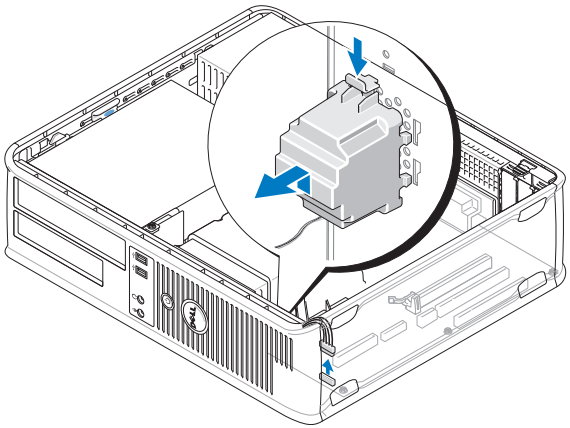
CAUTION: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).
3. Disconnect the cables from the system board.
4. Remove the speaker from the computer.

Mini Tower Computer



Desktop Computer



5 Follow the procedure in "After Working on Your Computer" on page 17.

Replacing a Speaker

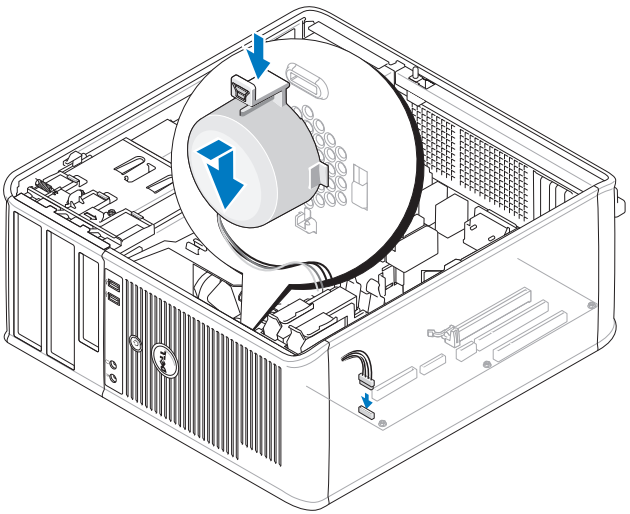
WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

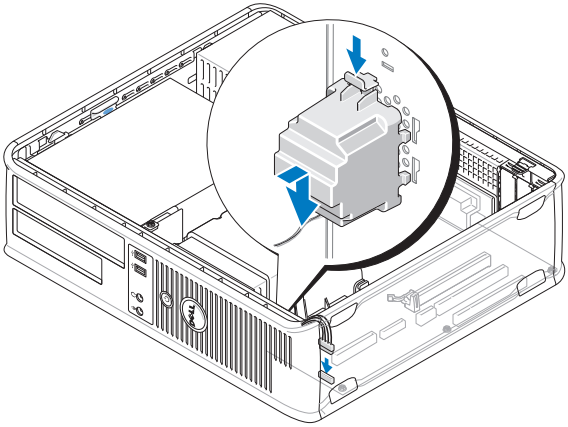
NOTE: This procedure assumes that you have completed the removal procedure first.

1 Insert the speaker into the chassis of the computer.

Mini Tower Computer



Desktop Computer



2 Connect the cables to the system board.

3 Follow the procedure in "After Working on Your Computer" on page 17.

11

Processor

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: Do not perform the following steps unless you are familiar with hardware removal and replacement. Performing these steps incorrectly could damage your system board.

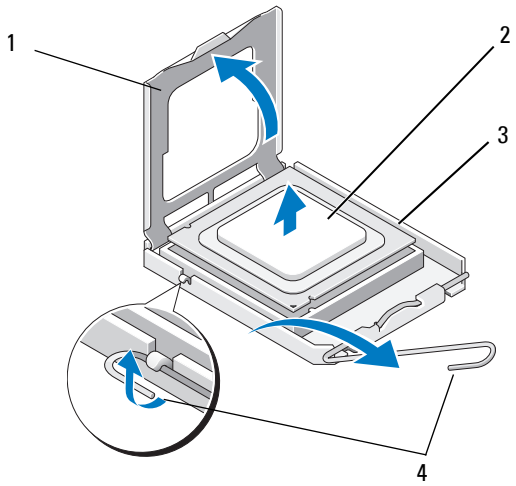
Removing the Processor

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).

WARNING: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Allow sufficient time for it to cool before touching it.

3. Remove the processor heat-sink assembly from the computer (see "Removing the Processor Heat-Sink Assembly" on page 85).

NOTE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.



1	processor cover	2	processor
3	socket	4	release lever

4 Release the release lever by pressing and pushing the release lever away from the processor cover.

5 Open the processor cover.

CAUTION: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

6 Lift the processor out of the socket and place it into static-protective packaging.

Leave the release lever extended in the release position so that the socket is ready for the new processor.

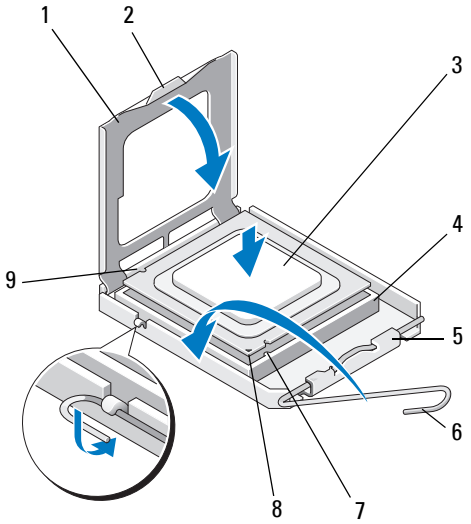
Replacing the Processor

CAUTION: Ground yourself by touching an unpainted metal surface on the back of the computer.

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Unpack the new processor, being careful not to touch the underside of the processor.

CAUTION: Socket pins are delicate. To avoid damage, ensure that the processor is aligned properly with the socket, and do not use excessive force when you install the processor. Be careful not to touch or bend the pins on the system board.



1	processor cover	2	tab
3	processor	4	processor socket
5	cover latch	6	release lever
7	front alignment-notch	8	processor pin-1 indicator
9	back alignment-notch		

2 Open the processor cover. If the cover is secured, pivot the release lever until the processor cover can be opened.

CAUTION: Position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

3 Align the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

4 Align the pin-1 corners of the processor and socket.

CAUTION: To avoid damage, align the processor properly with the socket, and do not use excessive force when you install the processor.

5 Gently seat the processor in the socket, ensuring it is positioned correctly.

6 Close the processor cover, ensuring the tab on the processor cover is positioned underneath the center cover latch on the socket.

7 Pivot the socket release lever back towards the socket and snap it into place to secure the processor.

8 Clean the thermal grease from the bottom of the heat sink.

CAUTION: Always apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

9 Apply new thermal solution to the top of the processor.

10 Replace the processor fan and heat sink assembly (see "Replacing the Processor Heat-Sink Assembly" on page 87).

CAUTION: Ensure that the processor fan and heat sink assembly is correctly seated and secure.

11 Follow the procedure in "After Working on Your Computer" on page 17.

12 Verify if your computer works correctly by running the Dell™ Diagnostics (see "Dell Diagnostics" on page 136).

12

Power Supply

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

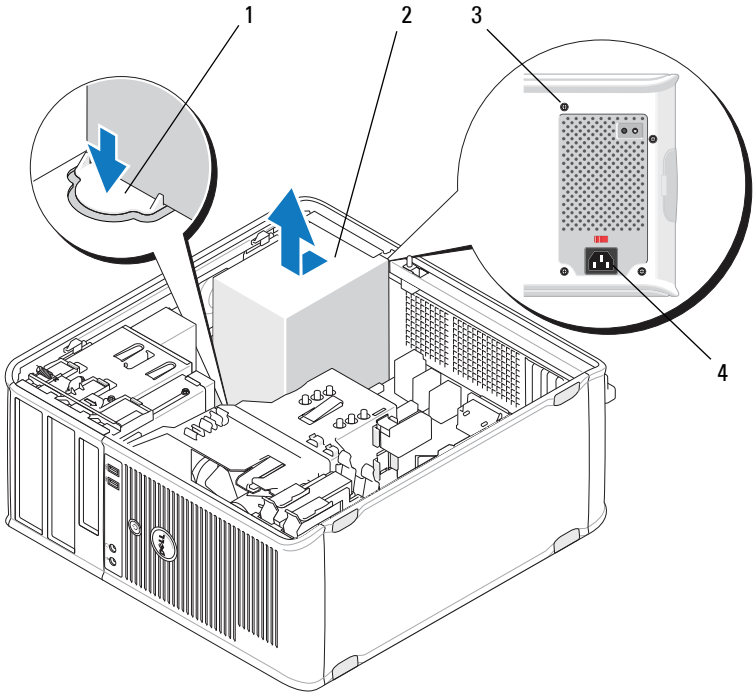
Mini Tower Computer Power Supply

Removing the Power Supply From the Mini Tower Computer

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19).
3. Disconnect the power cables from the system board and the drives.

CAUTION: Make note of the routing of the power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

4. Disengage all cables from the securing clip on the side of the power supply.
5. Remove the four screws that attach the power supply to the back of the computer chassis.



1	release button	2	power supply
3	screws (4)	4	AC power connector

6 Press down on the release button on the floor of the computer chassis, and slide the power supply toward the front of the computer by approximately one inch.

7 Lift the power supply up and out of the computer.

Replacing the Power Supply in the Mini Tower Computer

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Slide the power supply into place at the back of the computer chassis.

2 Replace and tighten the four screws that secure the power supply to the back of the computer chassis.

WARNING: The screws are a key part of the system grounding. Failure to replace and tighten all four screws may cause electrical shock.

CAUTION: Route the power cables under the chassis tabs. The cables must be properly routed to prevent the cables from being damaged.

3 Reconnect the power cables to the system board and drives.

4 Secure the hard drive cable, optical drive data cable, and the front panel cables to the securing clips inside the chassis, where available.

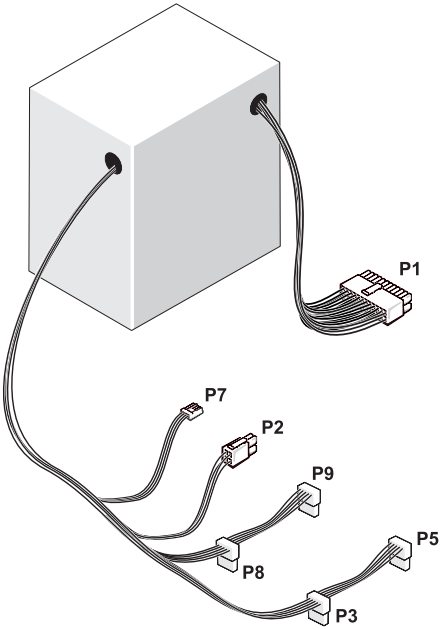
NOTE: Ensure all cable connectors are securely attached.

5 Follow the procedure in "After Working on Your Computer" on page 17.

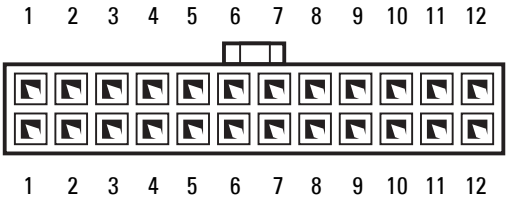
CAUTION: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6 Verify the computer works correctly by running the Dell™ Diagnostics (see "Dell Diagnostics" on page 136).

Power Connectors in the Mini Tower Computer



P1: System Board Connector — Mini Tower Computer



Pin Number	Signal Name	Wire Color	Wire Gauge
1	+3.3 VDC	Orange	AWG#20
2	+3.3 VDC	Orange	AWG#20
3	COM	Black	AWG#20

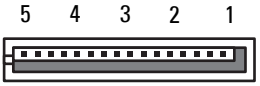
Pin Number	Signal Name	Wire Color	Wire Gauge
4	+5 VDC	Red	AWG#20
5	COM	Black	AWG#20
6	+5 VDC	Red	AWG#20
7	COM	Black	AWG#20
8	POK	Gray	AWG#22
9	Standby	Purple	AWG#20
10	+12 VADC	Yellow	AWG#20
11	+12 VADC	Yellow	AWG#20
12	+3.3 VDC	Orange	AWG#20
13	+3.3 VDC/SE*	Orange	AWG#20
14	-12 VDC	Blue	AWG#20
15	COM	Black	AWG#20
16	PS_ON	Green	AWG#22
17	COM	Black	AWG#20
18	COM	Black	AWG#20
19	COM	Black	AWG#20
20	NA	NA	AWG#20
21	+5 VDC	Red	AWG#20
22	+5 VDC	Red	AWG#20
23	+5 VDC	Red	AWG#20
24	COM	Black	AWG#20

* SE is a brown sense wire (AWG#22) and is optional.

P2: Processor Connector — Mini Tower Computer

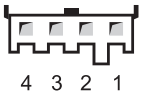
Pin Number	Signal Name	Wire Color	Wire Gauge
1	COM	Black	AWG#18
2	COM	Black	AWG#18
3	+12 VADC	Yellow	AWG#18
4	+12 VADC	Yellow	AWG#18

P3 and P5: Right Angle SATA Connectors — Mini Tower Computer



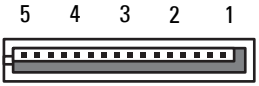
Pin Number	Signal Name	Wire Color	Wire Gauge
1	+3.3 VDC	Orange	AWG#18
2	COM	Black	AWG#18
3	+5 VDC	Red	AWG#18
4	COM	Black	AWG#18
5	+12 VADC	Yellow	AWG#18

P7: Floppy Disk Drive Connector — Mini Tower Computer



Pin Number	Signal Name	Wire Color	Wire Gauge
1	+5 VDC	Red	AWG#22
2	COM	Black	AWG#22
3	COM	Black	AWG#22
4	+12 VADC	Yellow	AWG#22

P8 and P9: Right Angle SATA Connectors — Mini Tower Computer



Pin Number	Signal Name	Wire Color	Wire Gauge
1	+3.3 VDC	Orange	AWG#18
2	COM	Black	AWG#18
3	+5 VDC	Red	AWG#18
4	COM	Black	AWG#18
5	+12 VADC	Yellow	AWG#18

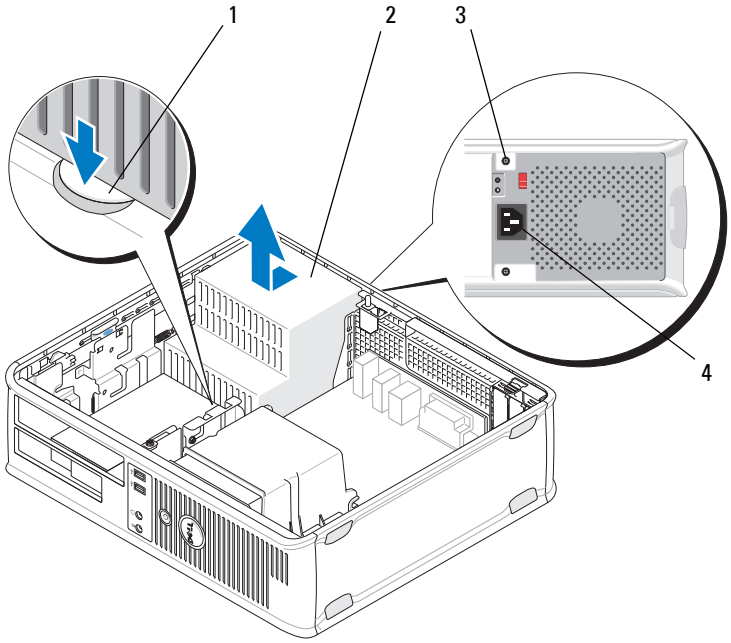
Desktop Computer Power Supply

Removing the Power Supply From the Desktop Computer

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Remove the computer cover (see "Removing the Desktop Computer Cover" on page 21).
3. Disconnect the power cables from the system board and the drives.

CAUTION: Note the routing of the power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.

4. Remove the two screws that attach the power supply to the back of the computer chassis.
5. Remove the optical drive and set it aside (see "Removing the Optical Drive From the Desktop Computer" on page 59).



1	release button	2	power supply
3	screws (2)	4	AC power connector

6 Press down on the release button on the floor of the computer chassis, and slide the power supply toward the front of the computer by approximately one inch.

7 Lift the power supply up and out of the computer.

Replacing the Power Supply in the Desktop Computer

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Slide the power supply into place at the back of the computer chassis.

2 Replace and tighten the two screws that secure the power supply to the back of the computer chassis.

WARNING: The screws are a key part of the system grounding. Failure to replace and tighten all four screws may cause electrical shock.

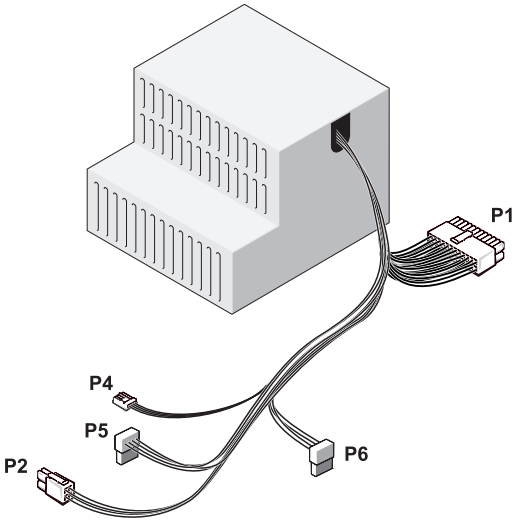
3. Reconnect the power cables to the system board and drives.
4. Secure the hard drive cable, optical drive data cable, and the front panel cables to the securing clips inside the chassis, where available.

   NOTE: Ensure that all cable connectors are securely attached.
5. Follow the procedure in "After Working on Your Computer" on page 17.

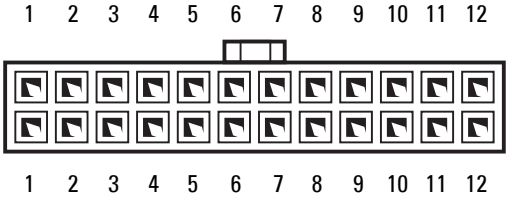
CAUTION: To connect a network cable, first plug the cable into the network device and then plug it into the computer.

6. Verify the computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 136).

Power Connectors in the Desktop Computer



P1: MB Connector — Desktop Computer



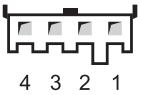
Pin Number	Signal Name	Wire Color	Wire Gauge
1	+3.3 VDC	Orange	AWG#20
2	+3.3 VDC	Orange	AWG#20
3	COM	Black	AWG#20
4	+5 VDC	Red	AWG#20
5	COM	Black	AWG#20
6	+5 VDC	Red	AWG#20
7	COM	Black	AWG#20
8	POK	Gray	AWG#22
9	+5 VFP	Purple	AWG#20
10	+12 VDC	White	AWG#20
11	+12 VDC	White	AWG#20
12	+3.3 VDC	Orange	AWG#20
13	+3.3 VDC/SE	Orange	AWG#20
14	-12 VDC	Blue	AWG#20
15	COM	Black	AWG#20
16	PS_ON	Green	AWG#22
17	COM	Black	AWG#20
18	COM	Black	AWG#20
19	COM	Black	AWG#20
20	NC	NC	AWG#20
21	+5 VDC	Red	AWG#20

Pin Number	Signal Name	Wire Color	Wire Gauge
22	+5 VDC	Red	AWG#20
23	+5 VDC	Red	AWG#20
24	COM	Black	AWG#20

P2: CPU Connector — Desktop Computer

Pin Number	Signal Name	Wire Color	Wire Gauge
1	COM	Black	AWG#18
2	COM	Black	AWG#18
3	+12 VDC	Yellow	AWG#18
4	+12 VDC	Yellow	AWG#18

P4: Floppy Disk Drive Connector — Desktop Computer



Pin Number	Signal Name	Wire Color	Wire Gauge
1	+5 VDC	Red	AWG#22
2	COM	Black	AWG#22
3	COM	Black	AWG#22
4	+12 VDC	Yellow	AWG#22

P5 and P6: Right Angle SATA Connectors — Desktop Computer

Pin Number	Signal Name	Wire Color	Wire Gauge
1	+3.3 VDC	Orange	AWG#18
2	COM	Black	AWG#18
3	+5 VDC	Red	AWG#18
4	COM	Black	AWG#18
5	+12 VDC	Yellow	AWG#18

13

BIOS

NOTE: If a BIOS-update program CD is provided with a new system board, flash the BIOS from the CD. If you do not have a BIOS-update program CD, see "Flashing the BIOS From the Hard Drive" on page 118.

Flashing the BIOS From a CD

1. Turn on your computer.
2. Press the eject button on the front of the optical drive to open the drive tray.
3. Place the BIOS-update disc in the center of the drive tray, and then press the eject button or gently push on the tray to close it.
4. Restart the computer.
5. When the DELL™ logo appears, press <F12> immediately.

   NOTE: Keyboard failure may result when a key on the keyboard is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals until the **Boot Device Menu** appears.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, and then shut down your computer and try again.

6. At the **Boot Device Menu**, use the up- and down-arrow keys, or press the appropriate number on the keyboard to highlight **Onboard or USB CD-ROM**, and then press <Enter>.

   NOTE: The one time boot menu feature changes the boot sequence for the current boot only. Upon restart, the computer boots according to the boot sequence specified in the system setup program.

CAUTION: Do not interrupt this process once it begins. Doing so may damage the system.

7. Follow the instructions that appear on the screen. The computer continues to boot and updates the new BIOS. When the flash update is complete, the computer automatically reboots.
8. Remove the flash BIOS update program CD from the drive.

Flashing the BIOS From the Hard Drive

1. Turn on the computer.
2. Locate the latest BIOS update file for your computer at **support.dell.com**.
3. Click **Download Now** to download the file.
4. If the **Export Compliance Disclaimer** window appears, click **Yes, I Accept this Agreement**.

   The **File Download** window appears.
5. Click **Save this program to disk**, and then click **OK**.

   The **Save In** window appears.
6. Click the down arrow to view the **Save In** menu, select **Desktop**, and then click **Save**.

   The file downloads to your desktop.
7. Click **Close** if the **Download Complete** window appears.

   The file icon appears on your desktop and is titled the same as the downloaded BIOS update file.
8. Double-click the file icon on the desktop and follow the instructions on the screen.

14

System Board

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: To guard against likelihood of electric shock, laceration by moving fan blades or other unexpected injuries, always unplug your computer from the electrical outlet before removing the cover.

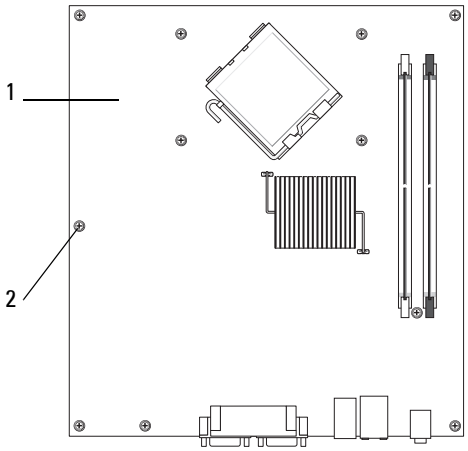
Removing the System Board

1. Follow the procedure in "Before Working on Your Computer" on page 9.
2. Set the computer on a clean and flat surface. (If you have a mini tower computer, set it on its right side.)
3. Remove the computer cover (see "Removing the Mini Tower Computer Cover" on page 19 or "Removing the Desktop Computer Cover" on page 21).
4. Remove all cards from the expansion-card slots (see "Cards" on page 29). Insert them individually into static-protective packaging.
5. Disconnect all CD/DVD/floppy/media card reader/hard drive data cables from the system board.
6. Disconnect all front panel cables from the system board.
7. Disconnect the 12-V and 24-pin power cables from the system board.
8. If you intend to replace the existing system board with another system board:
   a. Remove the processor heat-sink assembly (see "Removing the Processor Heat-Sink Assembly" on page 85).
   b. Remove the memory modules from the system board (see "Removing a Memory Module" on page 89) and place them individually into static-protective packaging.
   c. Remove the processor from the system board (see "Removing the Processor" on page 99) and place it into static-protective packaging.

9 Disconnect the fan power cables from the system board.

10 Disconnect any additional cables from the system board.

11 Remove the 11 screws securing the system board to the computer chassis.



1 system board 2 screws (11)

WARNING: The system board is fragile. Handle it carefully.

12 Lift the system board out of the computer chassis and place it into static-protective packaging.

Replacing the System Board

NOTE: This procedure assumes that you have completed the removal procedure first.

1 Remove the system board from its packaging and place it in position inside the computer chassis.

2 Align the 11 screw holes on the system board with the screw holes in the chassis, and ensure the back panel connectors are properly aligned in the openings on the back of the chassis.

3 Replace the 11 screws securing the system board to the computer chassis. Avoid over-tightening the screws.

WARNING: Failure to replace and tighten all screws properly may not provide adequate grounding of the system board and result system failures.

4. Connect the 12-V and 24-pin power cables to the system board.
5. Connect the chassis front-fan and chassis rear-fan power cables to the system board.
6. Connect all front panel cables to the system board.
7. Connect all CD/DVD/floppy/media card reader/hard drive data cables to the system board.
8. If the system board is a replacement:
   a. Install the memory modules onto the system board (see "Replacing or Adding a Memory Module" on page 90).
   b. Install the processor onto the system board (see "Replacing the Processor" on page 100).
   c. Install the processor heat-sink assembly onto the system board (see "Replacing the Processor Heat-Sink Assembly" on page 87).
9. Connect any additional cables to the system board as required.
10. Install all PCI and PCI Express cards into the expansion-card slots.
11. Check all cable connections throughout the computer chassis to ensure they are secure.
12. Follow the procedure in "After Working on Your Computer" on page 17.
13. Verify that your computer works correctly by running the Dell™ Diagnostics (see "Dell Diagnostics" on page 136).

1

Troubleshooting

Tools

Power Lights

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

WARNING: Always unplug your computer from the electrical outlet before opening the cover.

The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- If the power light is green and the computer is not responding, see "Beep Codes" on page 124.
- If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.
- If the power light is off, the computer is either turned off or is not receiving power.
  - Reseat the power cable into both the power connector on the back of the computer and the electrical outlet.
  - If the computer is plugged into a power strip, ensure the power strip is plugged into an electrical outlet and the power strip is turned on.
  - Bypass power protection devices, power strips, and power extension cables to verify if the computer turns on properly.
  - Ensure the electrical outlet is working by testing it with another device, such as a lamp.
  - Ensure the main power cable and front panel cable are securely connected to the system board (see "System Board Components" on page 13).

- If the power light is blinking amber, the computer is receiving electrical power, but an internal power problem may exist.
  - Ensure the voltage selection switch is set to match the AC power at your location, if applicable.
  - Ensure the processor power cable is securely connected to the system board (see "System Board Components" on page 13).
- If the power light is steady amber, a device may be malfunctioning or incorrectly installed.
  - Remove and reinstall the memory modules (see "Replacing or Adding a Memory Module" on page 90).
  - Remove and reinstall any cards (see "Cards" on page 29).
- Eliminate interference. Some possible causes of interference are:
  - Power, keyboard, and mouse extension cables
  - Too many devices on a power strip
  - Multiple power strips connected to the same electrical outlet

Beep Codes

Your computer might emit a series of beeps during start-up if the monitor cannot display errors or problems. This series of beeps, called a beep code, identifies a problem. For example, beep code 1-3-1 (one possible beep code) consists of one beep, a burst of three beeps, and then one beep. This beep code tells you that the computer encountered a memory problem.

Reseating the memory modules may correct the following beep code errors. If the problem persists, contact Dell™ (see "Contacting Dell" on page 159) for obtaining technical assistance.

Code	Cause
1-3-1 through 2-4-4	Memory not being properly identified or used
4-3-1	Memory failure above address 0FFFFh

If your computer emits a series of beeps during start-up:

1 Write down the beep code.

2 Run the Dell™ Diagnostics to further identify the problem. (see "Dell Diagnostics" on page 136).

Code	Cause
1-1-2	Microprocessor register failure
1-1-3	NVRAM read/write failure
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure
1-3	Video Memory Test failure
1-3-1 through 2-4-4	Memory not being properly identified or used
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
3-2-2	Interrupt vector loading failure
3-2-4	Keyboard Controller Test failure
3-3-1	NVRAM power loss
3-3-2	Invalid NVRAM configuration
3-3-4	Video Memory Test failure
3-4-1	Screen initialization failure
3-4-2	Screen retrace failure
3-4-3	Search for video ROM failure
4-2-1	No timer tick
4-2-2	Shutdown failure
4-2-3	Gate A20 failure
4-2-4	Unexpected interrupt in protected mode
4-3-1	Memory failure above address 0FFFFh

Code	Cause
4-3-3	Timer-chip counter 2 failure
4-3-4	Time-of-day clock stopped
4-4-1	Serial or parallel port test failure
4-4-2	Failure to decompress code to shadowed memory
4-4-3	Math-coprocessor test failure
4-4-4	Cache test failure

Diagnostic Lights

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage on www.dell.com at www.dell.com/regulatory_compliance.

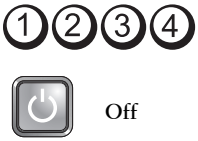
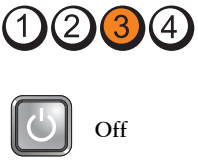
To help troubleshoot a problem, your computer has four lights labeled *1*, *2*, *3*, and *4* on the front panel.

NOTE: If you are using an ultra small form factor computer, the diagnostic lights are present on the back panel. See the *Setup and Quick Reference Guide* that ships with your computer for more information.

When the computer starts normally, the lights flash, and then turn off. If the computer malfunctions, use the sequence of the lights to help identify the problem.

NOTE: After the computer completes POST, all four lights turn off before booting to the operating system.

Diagnostic Light Codes During POST

Light Pattern	Problem Description	Suggested Resolution
 Off	The computer is either turned off or not receiving power.	• Reseat the power cable in the power connector on the back of the computer, and the electrical outlet. • Bypass power strips, power extension cables, and other power protection devices to verify the computer turns on properly. • Ensure any power strips being used are plugged into an electrical outlet and are turned on. • Ensure the electrical outlet is working by testing it with another device, such as a lamp. • Ensure the main power cable and front panel cable are securely connected to the system board.
 Off	A possible motherboard failure has occurred.	• Unplug the computer. Allow a minute for the power to drain. Plug the computer into a working electrical outlet and press the power button. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
Blinking Amber	A possible motherboard, power supply, or peripheral failure has occurred.	• Power off computer, leaving the computer plugged in. Press and hold the power supply test button on the back of the power supply unit. If the power supply diagnostic light next to the switch illuminates, the problem may be with your system board. Contact Dell (see "Contacting Dell" on page 159). If the power supply diagnostic light next to the switch does not illuminate, disconnect all internal and external peripherals, and press and hold the power supply test button.If it illuminates, there could be a problem with a peripheral. Contact Dell (see "Contacting Dell" on page 159). • If the power supply diagnostic light still does not illuminate, disconnect the power supply from the system board, then press and hold the power supply button. If the light illuminates, there could be a problem with the system board. If the power supply diagnostic light still does not illuminate, the problem is probably with the power supply. Contact Dell (see "Contacting Dell" on page 159).
Steady Amber	No CPU present.	• Reinstall the processor and restart the system. If the computer still fails to boot, inspect the processor socket for damage. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
	Memory modules are detected, but a memory power failure has occurred.	• If two or more memory modules are installed, remove the modules, then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. If only one memory module is installed, try moving it to a different DIMM connector and restart the computer. • If available, install verified working memory of the same type into your computer. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
	A possible CPU or motherboard failure has occurred.	• Replace the processor with a known good processor. If the computer still fails to boot, inspect the processor socket for damage. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
	BIOS may be corrupt or missing.	• The computer hardware is operating normally but the BIOS may be corrupt or missing. Contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
	A possible motherboard failure has occurred.	• Remove all cards from the PCI and PCI-E slots and restart the computer. If the computer boots, add the cards back one by one until you find the faulty one. • If the problem persists, the system board may be faulty. Contact Dell (see "Contacting Dell" on page 159).
	Power connector not installed properly.	• Reseat the 2x2 power connector from the power supply unit. • If the computer still fails to boot, contact Dell (see "Contacting Dell" on page 159).
	Possible peripheral card or motherboard failure has occurred.	• Remove all cards from the PCI and PCI-E slots and restart the computer. If the computer boots, add the cards back one by one until you find the faulty one. • If the problem persists, the system board is probably faulty. Contact Dell (see "Contacting Dell" on page 159).
	A possible motherboard failure has occurred.	• Disconnect all internal and external peripherals, and restart the computer. If the computer boots, add the peripheral back one by one until you find the faulty one. "Contacting Dell" on page 159. • If the problem persists, the system board is probably faulty. Contact Dell (see "Contacting Dell" on page 159).
	A possible coin cell battery failure has occurred.	• Remove the coin cell battery for one minute, reinstall the battery, and restart the computer. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
	The computer is in a normal *on* condition. The diagnostic lights are not lit after the computer successfully boots to the operating system.	• Ensure the display is connected and powered on. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
	A possible processor failure has occurred.	• Reseat the processor (see processor information for your computer). • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
	Memory modules are detected, but a memory failure has occurred.	• If two or more memory modules are installed, remove the modules and reinstall one module (see "Memory Modules" on page 89). Restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install working memory of the same type into your computer (see "Memory Modules" on page 89). • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
	A possible graphics card failure has occurred.	• Reseat any installed graphics cards (see the "Cards" section for your computer). • If available, install a working graphics card into your computer. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
	A possible floppy drive or hard drive failure has occurred.	Reseat all power and data cables.
	A possible USB failure has occurred.	Reinstall all USB devices and check all cable connections.
	No memory modules are detected.	• If two or more memory modules are installed, remove the modules, then reinstall one module and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install working memory of the same type into your computer . • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
	Memory modules are detected, but a memory configuration or compatibility error has occurred.	• Ensure no special requirements for memory module/connector placement exist. • Ensure the memory you are using is supported by your computer (see the *Setup and Quick Reference Guide* that ships with your computer). • If the problem persists, contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
   Steady Green	A possible expansion card failure has occurred.	• Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer (see the "Cards" section for your computer). • If the problem persists, reinstall the card you removed, then remove a different card and restart the computer. • Repeat this process for each expansion card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).
   Steady Green	Another failure has occurred.	• Ensure all hard drive and optical drive cables are properly connected to the system board (see the "System Board Components" section for your computer). • If there is an error message on the screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to make sure it is functioning properly. • If the operating system is attempting to boot from a device (such as the floppy drive or optical drive), check system setup to ensure the boot sequence is correct for the devices installed on your computer. • If the problem persists, contact Dell (see "Contacting Dell" on page 159).

Light Pattern	Problem Description	Suggested Resolution
1 2 3 4 Blinking Green	The computer is in standby mode.	Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.

System Messages

NOTE: If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

ALERT! PREVIOUS ATTEMPTS AT BOOTING THIS SYSTEM HAVE FAILED AT CHECKPOINT [NNNN]. FOR HELP IN RESOLVING THIS PROBLEM, PLEASE NOTE THIS CHECKPOINT AND CONTACT DELL TECHNICAL SUPPORT — The computer failed to complete the boot routine three consecutive times for the same error. Contact Dell technical support(see "Contacting Dell" on page 159).

CMOS CHECKSUM ERROR — Possible motherboard failure or RTC battery low. Replace the battery (see "Coin-Cell Battery" on page 93).

CPU FAN FAILURE — CPU fan failure. Replace the CPU fan (see "Removing the Processor" on page 99).

FLOPPY DISKETTE SEEK FAILURE — A cable may be loose, or the computer configuration information may not match the hardware configuration. Check cable connections. If the problem persists contact Dell technical support (see "Contacting Dell" on page 159).

DISKETTE READ FAILURE — The floppy disk may be defective or a cable may be loose. Replace the floppy disk/check for a loose cable connection.

HARD-DISK READ FAILURE — Possible HDD failure during HDD boot test. Contact Dell technical support (see "Contacting Dell" on page 159).

KEYBOARD FAILURE — Keyboard failure or keyboard cable loose (see "Keyboard Problems" on page 145).

NO BOOT DEVICE AVAILABLE — The system cannot detect a bootable device or partition.

- If the floppy drive is your boot device, ensure the cables are connected and a bootable floppy disk is in the drive.
- If the hard drive is your boot device, ensure the cables are connected, and that the drive is installed properly and partitioned as a boot device.

- Enter the system setup program and ensure the boot sequence information is correct. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

NO TIMER TICK INTERRUPT — A chip on the system board might be malfunctioning, or motherboard failure (see "Contacting Dell" on page 159).

NON-SYSTEM DISK OR DISK ERROR — Replace the floppy disk with one that has a bootable operating system or remove the floppy disk and restart the computer.

NOT A BOOT DISKETTE — Insert a bootable floppy disk and restart your computer.

NOTICE – HARD DRIVE SELF MONITORING SYSTEM HAS REPORTED THAT A PARAMETER HAS EXCEEDED ITS NORMAL OPERATING RANGE. DELL RECOMMENDS THAT YOU BACK UP YOUR DATA REGULARLY. A PARAMETER OUT OF RANGE MAY OR MAY NOT INDICATE A POTENTIAL HARD DRIVE PROBLEM. — S.M.A.R.T error, possible HDD failure. This feature can be enabled or disabled in the system setup program.

Hardware Troubleshooter

If a device is either not detected during the operating the system setup program, or is detected but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

Windows® XP:

1. Click **Start→ Help and Support**.
2. Type `hardware troubleshooter` in the search field and press <Enter> to start the search.
3. In the **Fix a Problem** section, click **Hardware Troubleshooter**.
4. In the **Hardware Troubleshooter** list, select the option that best describes the problem and click **Next** to follow the remaining troubleshooting steps.

Windows Vista®:

1. Click the Windows Vista Start button , and click **Help and Support.**
2. Type `hardware troubleshooter` in the search field and press <Enter> to start the search.
3. In the search results, select the option that best describes the problem and follow the remaining troubleshooting steps.

Dell Diagnostics

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

When to Use the Dell Diagnostics

If you experience a problem with your computer, perform the checks in this section, and then run the Dell™ Diagnostics before contacting Dell for assistance.

Start the Dell Diagnostics from your hard drive or from the *Drivers and Utilities* disc provided with your computer.

NOTE: The *Drivers and Utilities* disc is optional and may not ship with your computer.

NOTE: The Dell Diagnostics only operate on Dell computers.

Starting the Dell Diagnostics From Your Hard Drive

Before running the Dell Diagnostics, enter the system setup program to review your computer's configuration information, and ensure the device you want to test is displayed and active in the system setup program. For more information on using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

The Dell Diagnostics is located on a separate diagnostic utility partition on your hard drive.

NOTE: If your computer does not display a screen image, contact Dell (see "Contacting Dell" on page 159).

1. Ensure the computer is connected to an electrical outlet that is known to be working properly.
2. Turn on (or restart) your computer.
3. When the DELL logo appears, press <F12> immediately.

   NOTE: Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the Boot Device Menu.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop, shut down your computer and try again.

4 Use the up- and down-arrow keys to select **Diagnostics** from the boot menu and then press <Enter>.

NOTE: If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your *Drivers and Utilities* disc (see "Starting the Dell Diagnostics From the Drivers and Utilities Disc" on page 137).

5 Press any key to start the Dell Diagnostics from the diagnostics utility partition on your hard drive.

6 Press <Tab> to select **Test System** and then press <Enter>.

NOTE: It is recommended that you select **Test System** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to the previous menu.

7 At the Dell Diagnostics Main Menu, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see "Dell Diagnostics Main Menu" on page 139).

NOTE: Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

8 After all tests have completed, close the test window to return to the Dell Diagnostics Main Menu.

9 Close the Main Menu window to exit the Dell Diagnostics and restart the computer.

Starting the Dell Diagnostics From the Drivers and Utilities Disc

Before running the Dell Diagnostics, enter the system setup program to review your computer's configuration information and ensure that the device you want to test is displayed and active in the system setup program.

1 Insert the *Drivers and Utilities* disc into the optical drive.

2 Restart your computer.

3 When the DELL logo appears, press <F12> immediately.

NOTE: Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the Boot Device Menu.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, shut down your computer and try again.

4 When the boot device list appears, use the up- or down- arrow keys to highlight **CD/DVD/CD-RW Drive** then press <Enter>.

NOTE: Using the one-time boot menu changes the boot sequence for the current boot only. Upon restart, the computer boots according to the boot sequence specified in the system setup program. For more information about using the system setup program, see the *Dell Technology Guide* on your computer or at **support.dell.com**.

5 Press any key to confirm that you want to start from the CD/DVD.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, then shut down your computer and try again.

6 Press 1 to **Run the 32 Bit Dell Diagnostics**.

7 At the **Dell Diagnostics Menu**, press 1 to select **Dell 32-bit Diagnostics for Resource CD (graphical user interface)**.

8 Press <Tab> to select **Test System** and then press <Enter>.

NOTE: It is recommended that you select **Test System** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to the previous menu.

9 At the Dell Diagnostics Main Menu, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see "Dell Diagnostics Main Menu" on page 139).

NOTE: Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

10 After all tests have completed, close the test window to return to the Dell Diagnostics Main Menu.

11 Close the Main Menu window to exit the Dell Diagnostics and restart the computer.

12 Remove the *Drivers and Utilities* disc from the optical drive.

Dell Diagnostics Main Menu

After the Dell Diagnostics loads the following menu appears:

Option	Function
Test Memory	Run the stand-alone memory test
Test System	Run system diagnostics
Exit	Exit the diagnostics

Press <Tab> to select the test you want to run and then press <Enter>.

NOTE: It is recommended that you select **Test System** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to this menu.

After **Test System** is selected, the following menu appears:

Option	Function
Express Test	Performs a quick test of devices in the system. This typically can take 10 to 20 minutes. **NOTE:** The Express Test requires no interaction on your part. Run Express Test first to increase the possibility of tracing a problem quickly.
Extended Test	Performs a thorough check of devices in the system. This typically can take an hour or more. **NOTE:** The Extended Test periodically requires your input to answer specific questions.
Custom Test	Use to test a specific device or customize the tests to be run.

Option	Function *(continued)*
Symptom Tree	This option allows you to select tests based on a symptom of the problem you are having. This option lists the most common symptoms.

NOTE: It is recommended that you select **Extended Test** to perform a more thorough check of devices in the computer.

For any problem encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description exactly as it appears and follow the instructions on the screen. If you cannot resolve the problem, contact Dell (see "Contacting Dell" on page 159).

NOTE: When contacting Dell support, have your Service Tag ready. The Service Tag for your computer is located at the top of each test screen.

The following tabs provide additional information for tests run from the Custom Test or Symptom Tree option:

Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and any requirements for running the test.

Tab	Function *(continued)*
Configuration	Displays the hardware configuration for the selected device. The Dell Diagnostics obtains configuration information for all devices from the system setup program, memory, and various internal tests, and displays the information in the device list in the left pane of the screen. **NOTE:** The device list may not display the names of all components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test, if applicable, by changing the test settings.

Solving Problems

Follow these tips when troubleshooting your computer:

- If you added or removed a part before the problem started, review the installation procedures and ensure that the part is correctly installed.
- If a peripheral device does not work, ensure that the device is properly connected.
- If an error message appears on the screen, write down the exact message. This message may help support personnel diagnose and fix the problem(s).
- If an error message occurs in a program, see the program's documentation.

NOTE: The procedures in this document were written for the Windows default view, so they may not apply if you set your Dell computer to the Windows Classic view.

Battery Problems

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

REPLACE THE BATTERY — If you have to repeatedly reset time and date information after turning on the computer, or if an incorrect time or date displays during start-up, replace the battery (see "Coin-Cell Battery" on page 93). If the battery still does not work properly, contact Dell (see "Contacting Dell" on page 159).

Drive Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

ENSURE MICROSOFT WINDOWS RECOGNIZES THE DRIVE —

Windows XP:

- Click **Start** and click **My Computer**.

Windows Vista:

- Click the Windows Vista Start button and click **Computer**.

If the drive is not listed, perform a full scan with your antivirus software to check for and remove viruses. Viruses can sometimes prevent Windows from recognizing the drive.

TEST THE DRIVE —

- Insert another disc to eliminate the possibility that the original drive is defective.
- Insert a bootable floppy disc and restart the computer.

CLEAN THE DRIVE OR DISK — See the *Dell Technology Guide* on your computer or at **support.dell.com**.

CHECK THE CABLE CONNECTIONS

RUN THE HARDWARE TROUBLESHOOTER — See "Hardware Troubleshooter" on page 135.

RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 136.

Optical drive problems

NOTE: High-speed optical drive vibration is normal and may cause noise, which does not indicate a defect in the drive or the disc.

NOTE: Because of different regions worldwide and different disc formats, not all DVD titles work in all DVD drives.

ADJUST THE WINDOWS VOLUME CONTROL —

- Click the speaker icon in the lower-right corner of your screen.
- Ensure that the volume is turned up by clicking the slidebar and dragging it up.
- Ensure that the sound is not muted by clicking any boxes that are checked.

CHECK THE SPEAKERS AND SUBWOOFER — See "Sound and Speaker Problems" on page 153.

Problems writing to an optical drive

CLOSE OTHER PROGRAMS — The optical drive must receive a steady stream of data during the writing process. If the stream is interrupted, an error occurs. Try closing all programs before you write to the optical.

TURN OFF STANDBY MODE IN WINDOWS BEFORE WRITING TO A DISC — See the *Dell Technology Guide* on your computer or at **support.dell.com**, or search for the keyword *standby* in Windows Help and Support for information on power management modes.

Hard drive problems

RUN CHECK DISK —

Windows XP:

1. Click **Start** and click **My Computer**.
2. Right-click **Local Disk C:**.
3. Click **Properties**→ **Tools**→ **Check Now**.
4. Click **Scan for and attempt recovery of bad sectors** and click **Start**.

Windows Vista:

1. Click **Start** and click **Computer**.
2. Right-click **Local Disk C:**.
3. Click **Properties**→ **Tools**→ **Check Now**.

   The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue the desired action.
4. Follow the instructions on the screen.

Error Messages

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

If the error message is not listed, see the documentation for the operating system or the program that was running when the message appeared.

A FILENAME CANNOT CONTAIN ANY OF THE FOLLOWING CHARACTERS: \ / : * ? " < > | — Do not use these characters in filenames.

A REQUIRED .DLL FILE WAS NOT FOUND — The program that you are trying to open is missing an essential file. To remove and then reinstall the program:

Windows XP:

1 Click **Start**→ **Control Panel**→ **Add or Remove Programs**→ **Programs and Features**.

2 Select the program you want to remove.

3 Click **Uninstall**.

4 See the program documentation for installation instructions.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Programs**→ **Programs and Features**.

2 Select the program you want to remove.

3 Click **Uninstall**.

4 See the program documentation for installation instructions.

***drive letter*:\ IS NOT ACCESSIBLE. THE DEVICE IS NOT READY —** The drive cannot read the disc. Insert a disc into the drive and try again.

INSERT BOOTABLE MEDIA — Insert a bootable floppy disk, CD, or DVD.

NON-SYSTEM DISK ERROR — Remove the floppy disk from the floppy drive and restart your computer.

NOT ENOUGH MEMORY OR RESOURCES. CLOSE SOME PROGRAMS AND TRY AGAIN — Close all windows and open the program that you want to use. In some cases, you may have to restart your computer to restore computer resources. If so, run the program that you want to use first.

OPERATING SYSTEM NOT FOUND — Contact Dell (see "Contacting Dell" on page 159).

IEEE 1394 Device Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

NOTE: Your computer supports only IEEE 1394a standard.

ENSURE THAT THE CABLE FOR THE IEEE 1394 DEVICE IS PROPERLY INSERTED INTO THE DEVICE AND INTO THE CONNECTOR ON THE COMPUTER

ENSURE THAT THE IEEE 1394 DEVICE IS ENABLED IN SYSTEM SETUP — See the *Dell Technology Guide* on your computer or at **support.dell.com**.

ENSURE THAT THE IEEE 1394 DEVICE IS RECOGNIZED BY WINDOWS —

Windows XP:

1 Click **Start** and click **Control Panel**.

2 Under **Pick a Category**, click **Performance and Maintenance**→ **System**→ **System Properties** → **Hardware**→ **Device Manager**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**.

2 Click **Device Manager**.

If your IEEE 1394 device is listed, Windows recognizes the device.

IF YOU HAVE PROBLEMS WITH A DELL IEEE 1394 DEVICE — Contact Dell (see "Contacting Dell" on page 159).

IF YOU HAVE PROBLEMS WITH AN IEEE 1394 DEVICE NOT PROVIDED BY DELL —

Contact the IEEE 1394 device manufacturer.

Keyboard Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CHECK THE KEYBOARD CABLE —

- Ensure the keyboard cable is firmly connected to the computer.
- Shut down the computer (see "Before Working on Your Computer" on page 9), reconnect the keyboard cable as shown on the setup diagram for your computer, and then restart the computer.

- Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any keyboard extension cables and connect the keyboard directly to the computer.

TEST THE KEYBOARD — Connect a properly working keyboard to the computer, then try using the keyboard.

RUN THE HARDWARE TROUBLESHOOTER — See "Hardware Troubleshooter" on page 135.

Lockups and Software Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

The computer does not start up

CHECK THE DIAGNOSTIC LIGHTS — See "Power Lights" on page 123.

ENSURE THAT THE POWER CABLE IS FIRMLY CONNECTED TO THE COMPUTER AND TO THE ELECTRICAL OUTLET

The computer stops responding

CAUTION: You may lose data if you are unable to perform an operating system shutdown.

TURN THE COMPUTER OFF — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

A program stops responding

END THE PROGRAM —

1. Press <Ctrl><Shift><Esc> simultaneously to access the Task Manager.
2. Click the **Applications** tab.
3. Click to select the program that is no longer responding.
4. Click **End Task**.

A program crashes repeatedly

NOTE: Most software includes installation instructions in its documentation or on a floppy disk, CD, or DVD.

CHECK THE SOFTWARE DOCUMENTATION — If necessary, uninstall and then reinstall the program.

A program is designed for an earlier Windows operating system

RUN THE PROGRAM COMPATIBILITY WIZARD —

Windows XP:

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-Windows XP operating system environments.

1. Click **Start**→ **All Programs**→ **Accessories**→ **Program Compatibility Wizard**→ **Next**.
2. Follow the instructions on the screen.

Windows Vista:

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-Windows Vista operating system environments.

1. Click **Start** → **Control Panel**→ **Programs**→ **Use an older program with this version of Windows.**
2. In the welcome screen, click **Next**.
3. Follow the instructions on the screen.

A solid blue screen appears

TURN THE COMPUTER OFF — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for 8 to 10 seconds (until the computer turns off), and then restart your computer.

Other software problems

CHECK THE SOFTWARE DOCUMENTATION OR CONTACT THE SOFTWARE MANUFACTURER FOR TROUBLESHOOTING INFORMATION —

- Ensure that the program is compatible with the operating system installed on your computer.
- Ensure that your computer meets the minimum hardware requirements needed to run the software. See the software documentation for information.
- Ensure that the program is installed and configured properly.
- Verify that the device drivers do not conflict with the program.
- If necessary, uninstall and then reinstall the program.

BACK UP YOUR FILES IMMEDIATELY

USE A VIRUS-SCANNING PROGRAM TO CHECK THE HARD DRIVE, FLOPPY DISKS, CDS, OR DVDS

SAVE AND CLOSE ANY OPEN FILES OR PROGRAMS AND SHUT DOWN YOUR COMPUTER THROUGH THE START MENU

Memory Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

IF YOU RECEIVE AN INSUFFICIENT MEMORY MESSAGE —

- Save and close any open files and exit any open programs you are not using to see if that resolves the problem.
- See the software documentation for minimum memory requirements. If necessary, install additional memory (see "Replacing or Adding a Memory Module" on page 90).
- Reseat the memory modules to ensure that your computer is successfully communicating with the memory.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 136).

IF YOU EXPERIENCE OTHER MEMORY PROBLEMS —

- Reseat the memory modules (see "Replacing or Adding a Memory Module" on page 90).
- Ensure you are following the memory installation guidelines.
- Ensure the memory you are using is supported by your computer. For more information about the type of memory supported by your computer, see the documentation that shipped with your computer.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 136).

Mouse Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CHECK THE MOUSE CABLE —

- Ensure the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any mouse extension cables, and connect the mouse directly to the computer.
- Verify the mouse cable is connected as shown on the setup diagram for your computer.

RESTART THE COMPUTER —

1. Simultaneously press <Ctrl><Esc> to display the **Start** menu.
2. Press <U>, press the up- and down-arrow keys to highlight **Shut down** or **Turn Off**, and then press <Enter>.
3. After the computer turns off, reconnect the mouse cable as shown on the setup diagram.
4. Turn on the computer.

TEST THE MOUSE — Connect a properly working mouse to the computer, then try using the mouse.

CHECK THE MOUSE SETTINGS —

Windows XP

1. Click **Start**→ **Control Panel**→ **Mouse**.
2. Adjust the settings as needed.

Windows Vista:

1. Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Mouse**.
2. Adjust the settings as needed.

REINSTALL THE MOUSE DRIVER — See the *Dell Technology Guide* on your computer or at **support.dell.com**.

RUN THE HARDWARE TROUBLESHOOTER — See "Hardware Troubleshooter" on page 135.

Network Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CHECK THE NETWORK CABLE CONNECTOR — Ensure the network cable is firmly inserted into the network connector on the back of the computer and the network jack.

CHECK THE NETWORK LIGHTS ON THE BACK OF THE COMPUTER — If the link integrity light is off (see "About Your Computer" in the *Setup and Quick Reference*

Guide), no network communication is occurring. Replace the network cable.

RESTART THE COMPUTER AND LOG ON TO THE NETWORK AGAIN

CHECK YOUR NETWORK SETTINGS — Contact your network administrator or the person who set up your network to verify your network settings are correct and that the network is functioning.

RUN THE HARDWARE TROUBLESHOOTER — See "Hardware Troubleshooter" on page 135.

Power Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

IF THE POWER LIGHT IS GREEN AND THE COMPUTER IS NOT RESPONDING — See "Power Lights" on page 123.

IF THE POWER LIGHT IS BLINKING GREEN — The computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.

IF THE POWER LIGHT IS OFF — The computer is either turned off or is not receiving power.

- Reseat the power cable in the power connector on the back of the computer and the electrical outlet.
- Bypass power strips, power extension cables, and other power protection devices to verify that the computer turns on properly.
- Ensure any power strips being used are plugged into an electrical outlet and are turned on.
- Ensure the electrical outlet is working by testing it with another device, such as a lamp.
- Ensure the main power cable and front panel cable are securely connected to the system board (see "System Board Components" on page 13).

IF THE POWER LIGHT IS BLINKING AMBER — The computer is receiving electrical power, but an internal power problem may exist.

- Ensure the voltage selection switch is set to match the AC power at your location (if applicable).
- Ensure all components and cables are properly installed and securely connected to the system board (see "System Board Components" on page 13).

IF THE POWER LIGHT IS STEADY AMBER — A device may be malfunctioning or incorrectly installed.

- Ensure the processor power cable is securely connected to the system board power connector (POWER2) (see "System Board Components" on page 13).
- Remove and then reinstall all memory modules (see "Replacing or Adding a Memory Module" on page 90).
- Remove and then reinstall any expansion cards, including graphics cards (see "Cards" on page 29).

ELIMINATE INTERFERENCE — Some possible causes of interference are:

- Power, keyboard, and mouse extension cables
- Too many devices connected to the same power strip
- Multiple power strips connected to the same electrical outlet

Printer Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

NOTE: If you need technical assistance for your printer, contact the printer's manufacturer.

CHECK THE PRINTER DOCUMENTATION — See the printer documentation for setup and troubleshooting information.

ENSURE THAT THE PRINTER IS TURNED ON

CHECK THE PRINTER CABLE CONNECTIONS —

- See the printer documentation for cable connection information.
- Ensure the printer cables are securely connected to the printer and the computer.

TEST THE ELECTRICAL OUTLET — Ensure the electrical outlet is working by testing it with another device, such as a lamp.

VERIFY THE PRINTER IS RECOGNIZED BY WINDOWS —

Windows XP:

1. Click **Start→ Control Panel→ Printers and Other Hardware→ View installed printers or fax printers**.
2. If the printer is listed, right-click the printer icon.

3 Click **Properties**→ **Ports**. For a parallel printer, ensure that the **Print to the following port(s):** setting is **LPT1 (Printer Port)**. For a USB printer, ensure that the **Print to the following port(s):** setting is **USB**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Printer**.

2 If the printer is listed, right-click the printer icon.

3 Click **Properties and click Ports**.

4 Adjust the settings, as needed.

REINSTALL THE PRINTER DRIVER — See the printer documentation for information on reinstalling the printer driver.

Scanner Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

NOTE: If you need technical assistance for your scanner, contact the scanner's manufacturer.

CHECK THE SCANNER DOCUMENTATION — See the scanner documentation for setup and troubleshooting information.

UNLOCK THE SCANNER — Ensure that your scanner is unlocked (if the scanner has a locking tab or button).

RESTART THE COMPUTER AND TRY THE SCANNER AGAIN

CHECK THE CABLE CONNECTIONS —

- See the scanner documentation for information on cable connections.
- Ensure that the scanner cables are securely connected to the scanner and the computer.

VERIFY THAT THE SCANNER IS RECOGNIZED BY MICROSOFT WINDOWS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Printers and Other Hardware**→ **Scanners and Cameras**.

2 If your scanner is listed, Windows recognizes the scanner.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Scanners and Cameras**.

2 If the scanner is listed, Windows recognizes the scanner.

REINSTALL THE SCANNER DRIVER — See the scanner documentation for instructions.

Sound and Speaker Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

No sound from speakers

NOTE: The volume control in MP3 and other media players may override the Windows volume setting. Always check to ensure the volume on the media player(s) has not been turned down or off.

CHECK THE SPEAKER CABLE CONNECTIONS — Ensure the speakers are connected as shown on the setup diagram supplied with the speakers. If you purchased a sound card, ensure that the speakers are connected to the card.

ENSURE THAT THE SUBWOOFER AND THE SPEAKERS ARE TURNED ON — See the setup diagram supplied with the speakers. If your speakers have volume controls, adjust the volume, bass, or treble to eliminate distortion.

ADJUST THE WINDOWS VOLUME CONTROL — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure the volume is turned up and that the sound is not muted.

DISCONNECT HEADPHONES FROM THE HEADPHONE CONNECTOR — Sound from the speakers is automatically disabled when headphones are connected to the computer's headphone connector.

TEST THE ELECTRICAL OUTLET — Ensure the electrical outlet is working by testing it with another device, such as a lamp.

ELIMINATE POSSIBLE INTERFERENCE — Turn off nearby fans, fluorescent lights, or halogen lamps to check for interference.

RUN THE SPEAKER DIAGNOSTICS

REINSTALL THE SOUND DRIVER — See the *Dell Technology Guide* on your computer or at **support.dell.com**.

RUN THE HARDWARE TROUBLESHOOTER — See "Hardware Troubleshooter" on page 135.

No sound from headphones

CHECK THE HEADPHONE CABLE CONNECTION — Ensure the headphone cable is

securely inserted into the headphone connector (see "Inside View of Your Computer" on page 11).

ADJUST THE WINDOWS VOLUME CONTROL — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure the volume is turned up and that the sound is not muted.

Video and Monitor Problems

WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the Regulatory Compliance Homepage at www.dell.com/regulatory_compliance.

CAUTION: If your computer came with a PCI graphics card installed, removal of the card is not necessary when installing additional graphics cards; however, the card is required for troubleshooting purposes. If you remove the card, store it in a safe and secure location. For information about your graphics card, go to support.dell.com.

The screen is blank

NOTE: For troubleshooting procedures, see the monitor's documentation.

The screen is difficult to read

CHECK THE MONITOR CABLE CONNECTION —

- Ensure the monitor cable is connected to the correct graphics card (for dual graphics card configurations).
- If you are using the optional DVI-to-VGA adapter, ensure that the adapter is correctly attached to the graphics card and monitor.
- Ensure that the monitor cable is connected as shown on the setup diagram for your computer.
- Remove any video extension cables and connect the monitor directly to the computer.
- Swap the computer and monitor power cables to determine if the monitor's power cable is defective.
- Check the connectors for bent or broken pins (it is normal for monitor cable connectors to have missing pins).

CHECK THE MONITOR POWER LIGHT —

- If the power light is lit or blinking, the monitor has power.
- If the power light is off, press the button to ensure that the monitor is turned on.

- If the power light is blinking, press a key on the keyboard or move the mouse to resume normal operation.

TEST THE ELECTRICAL OUTLET — Ensure the electrical outlet is working by testing it with another device, such as a lamp.

CHECK THE DIAGNOSTIC LIGHTS — See "Power Lights" on page 123.

CHECK THE MONITOR SETTINGS — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

MOVE THE SUBWOOFER AWAY FROM THE MONITOR — If your speaker system includes a subwoofer, ensure that the subwoofer is positioned at least 60 centimeters (2 feet) away from the monitor.

MOVE THE MONITOR AWAY FROM EXTERNAL POWER SOURCES — Fans, fluorescent lights, halogen lamps, and other electrical devices can cause the screen image to appear *shaky*. Turn off nearby devices to check for interference.

ROTATE THE MONITOR TO ELIMINATE SUNLIGHT GLARE AND POSSIBLE INTERFERENCE

ADJUST THE WINDOWS DISPLAY SETTINGS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Appearance and Themes**.

2 Click the area you want to change or click the **Display** icon.

3 Try different settings for **Color quality** and **Screen resolution**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Personalization**→ **Display Settings**.

2 Adjust **Resolution** and **Colors settings,** as needed.

3D image quality is poor

CHECK THE MONITOR SETTINGS — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

Only part of the display is readable

CONNECT ANOTHER MONITOR —

1 Shut down your computer and connect another monitor to the computer.

2 Turn on the computer, the monitor, and adjust the monitor brightness and contrast controls.

If the other monitor works, the original computer display may be defective. Contact Dell (see "Contacting Dell" on page 159).

Dell Technical Update Service

The Dell Technical Update service provides proactive e-mail notification of software and hardware updates for your computer. The service is free and can be customized for content, format, and how frequently you receive notifications.

To enroll for the Dell Technical Update service, go to **support.dell.com/technicalupdate**.

Dell Support Utility

The Dell Support Utility is installed on your computer and available from the Dell Support icon on the taskbar or from the **Start** button. Use this support utility for self-support information, software updates, and health scans of your computing environment.

Accessing the Dell Support Utility

Access the Dell Support Utility from the icon on the taskbar or from the **Start** menu.

If the Dell Support icon does not appear in your taskbar:

1. Click **Start**→ **All Programs**→ **Dell Support**→ **Dell Support Settings**.
2. Ensure that the **Show icon on the taskbar** option is checked.

NOTE: If the Dell Support Utility is not available from the **Start** menu, download the software from the Dell Support website at **support.dell.com**.

The Dell Support Utility is customized for your computing environment.

The icon in the taskbar functions differently when you click, double-click, or right-click the icon.

Clicking the Dell Support Icon

Click or right-click the icon to perform the following tasks:

- Check your computing environment.
- View the Dell Support Utility settings.

- Access the help file for the Dell Support Utility.
- View frequently asked questions.
- Learn more about the Dell Support Utility.
- Turn the Dell Support Utility off.

Double-Clicking the Dell Support Icon

Double-click the icon to manually check your computing environment, view frequently asked questions, access the help file for the Dell Support Utility, and view Dell Support settings.

For more information about the Dell Support Utility, click the question mark (**?**) at the top of the **Dell Support** screen.

2

Contacting Dell

To contact Dell for sales, technical support, or customer service issues:

1. Visit **support.dell.com**.
2. Verify your country or region in the **Choose a Country/Region** drop-down menu at the bottom of the page.
3. Click **Contact Us** on the left side of the page.
4. Select the appropriate service or support link based on your need.
5. Choose the method of contacting Dell that is convenient for you.